

Homes

for future generations

Seven short essays:

in search of better homes and places

Ed Green, Welsh School of Architecture

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Homes for Future Generations_seven short essays: in search of better homes and places

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This report provides a route-map for housing that meets the needs of the present, “without compromising the ability of future generations to meet their own needs”.*

Seven essays draw from six case studies to discuss the importance of strategic thinking, consideration of the local context, and design that is concerned first and foremost with people, both now and in the future...



* *Our Common Future* (World Commission on Environment and Development, 1987)

1 Executive summary

This project explored how new homes can meet the aspirations of the Wellbeing of Future Generations Act (WFGA) and, by implication, the United Nations Sustainable Development Goals (SDGs). Seven guiding principles relate to the seven WFGA goals:



Housing should be planned with a focus on people over vehicles, guided by appropriate assumptions about car parking and infrastructure. (Adoption of the Wales Parking Standard typically compromises space for amenity and ecology.) Development should be biodiverse. Ecologically valuable, useful, connected amenity spaces should contribute to a nature recovery network. The ownership, use and character of these spaces should be unambiguous. (see essay 1 and the Wildlife Trusts report: *Homes for People and Wildlife*)



Developments should have a clear character and a defined sense of place. (Generic house types tends to diminish these qualities.) The architectural language should be culturally informed and contextually relevant. Neighbourhoods should accommodate societies, events and cultural activities. (see essay 2 and DCfW report: *Homes and Places 2*)



Understanding the user is key to better decision-making; people should be at the centre of housing design. (Generic housing that tries to accommodate everyone equally tends not to really suit anyone.) Decent space standards, long term quality and engagement with the user should be prioritised over short-term capital cost. (see essay 3 and *The Housing Design Handbook* by Levitt et. al)



Neighbourhoods should be developed with clear connections to their context and to existing communities. Improved permeability, shared amenities and spaces for play and intergenerational activity should increase the sense of ownership, with particular focus on younger generations. (see essay 4 and Play Wales' online publication *Childhood, Play and the Playwork Principles*)



Use of locally available, low carbon and carbon sequestering materials should be maximised. Techniques employing local materials, systems or people should be prioritised. Opportunities for training and reskilling should be exploited. Together, these changes will build valuable, productive, locally based, low carbon circular economies. (see essay 5 and the *Zero Carbon Homes* report by Wood Knowledge Wales)



Homes must be comfortable to occupy and affordable to heat. They should be built of healthy materials. Views, natural light, spatial arrangements and boundary treatments should connect occupants to the outdoors and each other. Neighbourhoods should support activities that promote physical and mental health and wellbeing. (see essay 6 & BRE report *The Full Cost of Poor Housing*)



All new homes should be carbon negative and energy positive. Homes should minimise energy use through a combination of efficient fabric, heat from low carbon sources and on-site renewables. A common agenda is needed to drive behaviour change and promote better collective decision-making over personal convenience. (see essay 7 and the *London Energy Transformation Initiative*)

Anyone involved in the procurement, design and construction of public housing in Wales now has a responsibility to think longer term and adopt principles other than 'reduce capital cost' – from policy makers and landlords to site operatives and maintenance teams. The design work produced for this project describes a rich array of benefits that can be derived from better housing, if appropriate guiding principles are adopted. However, the research also revealed constraints that prevent new housing from being designed and built with a longer term perspective, or diminish the benefits that result.

The potential of public and private sector housing developments to meet WFGA aspirations is often compromised by decisions made before designers and constructors get involved. Collective responsibility for better housing must be extended to a wider group of stakeholders. This includes people who make decisions about the location and type of future housing developments, people who design, maintain, adapt and demolish our homes, and of course the people who inhabit them. Key lessons are summarised for each group overleaf.

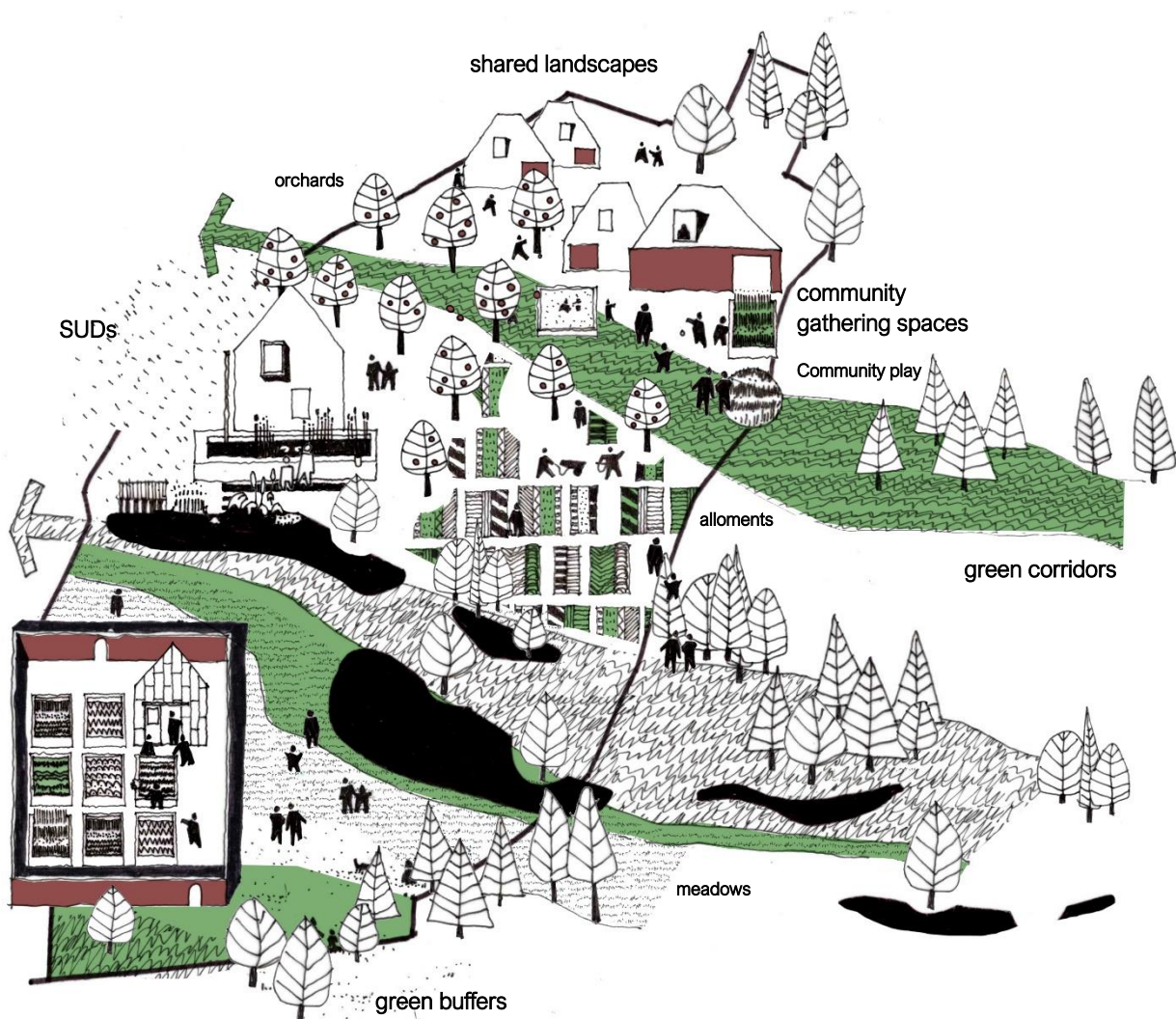


Figure 1a: a rich array of shared spaces promoting connectedness, activity, health, wellbeing and ecology

POLICY AND PLANNING

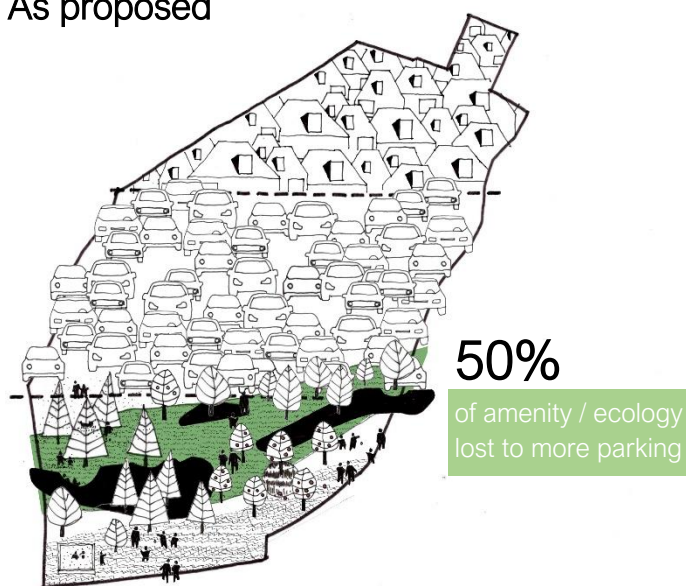
Strategic decision-making must be improved, if housing is to meet WFGA aspirations.

The importance of location cannot be overstated. Housing supply and demand are not nearly as well correlated as housing supply and developer profit, which tends to result in the development of large parcels of land in more affluent, easy-to-reach areas. Much of Wales consists of small towns in dire need of more, better homes to sustain existing communities and allow for some growth. However, established settlement boundaries, fragmented sites and depressed property values often limit opportunities to deliver homes where they are really needed – locations that are potentially more sustainable.

Sustainable communities require well connected streets, good public transport, plentiful local amenities, abundant low carbon energy and sustainable drainage. Tight, constrained brownfield sites are more likely to meet these criteria than the large, open edge-of-settlement sites preferred by volume housebuilders. Where possible, housing should be used to bring life – and investment – back into our towns and villages, rather than pushing people out to their periphery.

The Wales Parking Standard (typically one parking space per bedroom) severely compromises the potential of housing schemes to include meaningful amenity and ecology, while meeting established targets for density. However, most of the land currently earmarked for housing is not viable unless parking is provided on site, if homes are to meet the needs of a 'typical' household. Better criteria must be used to allocate sites for housing. Housing models must be developed that suit different locations, and that balance land use, density, amenity, ecology and the car. The improvement and expansion of public transport networks must be prioritised.

As proposed



Adopting the Wales Parking Standard

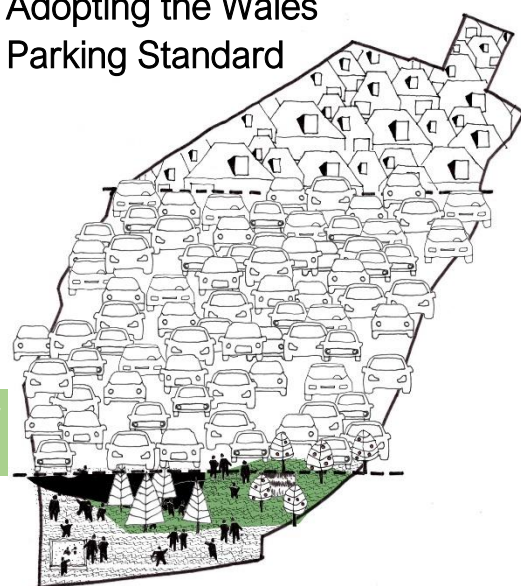


Figure 1b: By carefully planning infrastructure and parking, almost a third of the site can be freed up for amenity and ecology (as proposed, left). In contrast, compliance with the Wales Parking Standard (right) means that half of the space allocated for amenity and ecology is lost to additional parking.

The private sector cannot be expected to instigate change of this magnitude. A substantial social housing programme that builds better homes and neighbourhoods throughout Wales would provide opportunities to demonstrate the many benefits of designing and constructing better, and raise expectations within the private sector.

Retrofit of the existing housing stock and accelerated delivery of new homes are already being put forward as key components of a post-Covid economic recovery. Many of the benefits of better homes outlined in this report would add considerably to the value of carefully retrofitted existing homes or well designed and properly built new homes, but housing developers must be given tools to compare these benefits if they are to make informed decisions, for example by prioritising one benefit over another. Clear metrics should be established for measuring and comparing different benefits of better homes. These metrics should be used to account for better decision-making.

It is important to recognise that there is no single *silver bullet*, and housing models that fully realise WFGA ambitions are unlikely to appear overnight. Housing providers must adopt an aspirational approach, continually pushing best practice, until truly sustainable development becomes the new 'norm'.

DESIGN, CONSTRUCTION AND COST

There are barriers to better housing that design alone cannot overcome (see previous page). However, design has a clear remit - to ensure that housing is contextually appropriate and meets the needs of the user. (Standardised house types tend to be reductive in terms of character, contextual relevance and suitability for end users.) Homes must be designed with the user at the centre of the process. Neighbourhoods must be designed with a language that considers context and speaks of place.

Housing is not being constructed to a standard commensurate with societal goals. The climate crisis demands that we build better homes – not just for ourselves and our future generations, but for a better future globally. International decarbonisation targets demand higher levels of energy efficiency than UK Building Regulations, and most new homes underperform 'as built' due to the performance gap.

All new housing must be built to a standard that meets international targets.

It is entirely possible to build carbon negative homes today. They do not need to cost significantly more than established housing models (see section 5.3), and the potential benefits are extensive. Some benefits offer quantifiable longer term cost savings (see essays 5 and 6). Other benefits are more difficult to measure, but no less important.

Some decisions that move us away from an exclusive focus on capital cost should be easy to make, because the wider impacts are well known (e.g. reducing the amount of cement and PVC used in construction). However, in the first instance, such changes require strong leadership and top-down regulation if they are to be widespread and lasting. Standards must be enforceable.

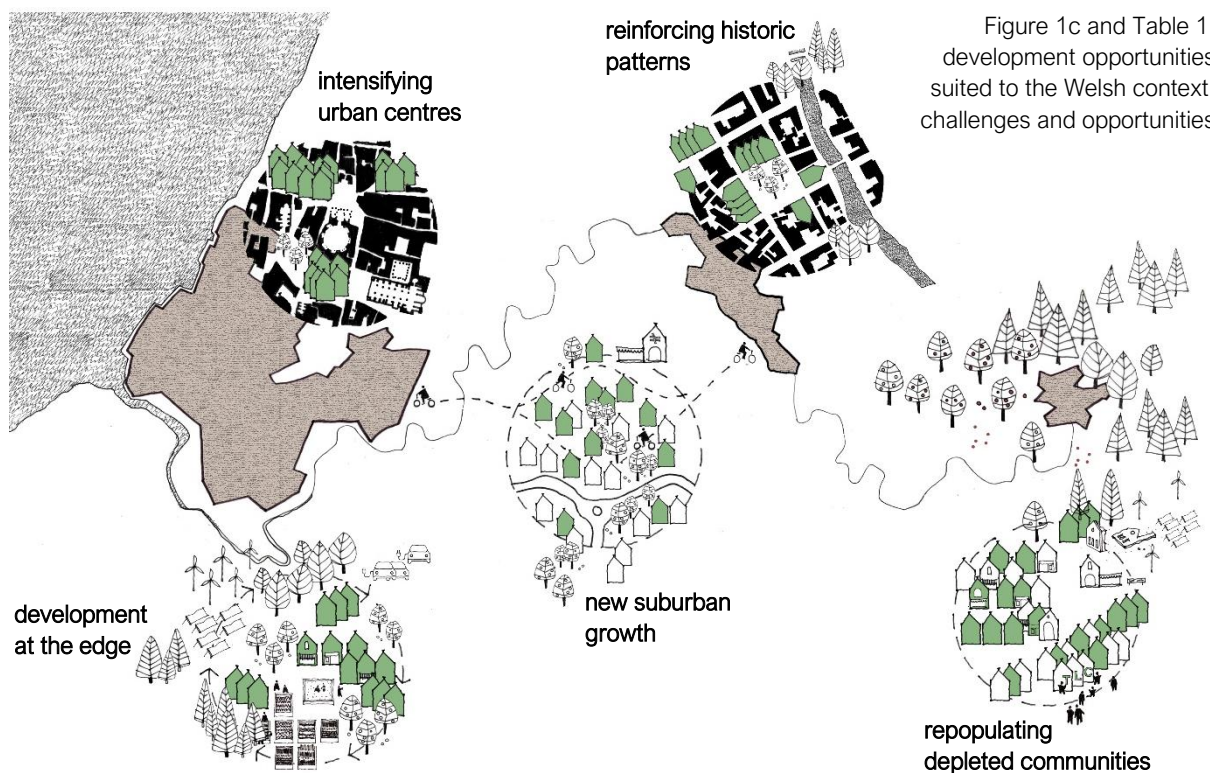


Figure 1c and Table 1: development opportunities suited to the Welsh context, challenges and opportunities

Development	location	site and density	Character	health, wellbeing	opportunity
Intensifying urban centres	Better public transport and local amenities mean that low / zero parking is needed.	Brownfield sites. Higher density puts pressure on internal and external space standards.	Characterful development can improve the wider identity of a place.	Poor air quality. Typically hard contexts with limited local ecology / biodiversity.	Investing in town and city centres to benefit the wider community.
Reinforcing historic patterns	By improving public transport and local amenities, car use can reasonably be reduced.	Older urban grain often achieves high densities but limits opportunities to improve.	Existing neighbourhoods often have an established character / sense of place.	Higher density neighbourhoods often prioritise privacy over community.	Complimenting existing housing types and development patterns.
New suburban growth	Limited public transport and local amenities. Estate roads limit growth <i>unless</i> low car use is justified.	Low density estates typically dominated by car use. Infill can increase density and variety.	Repetitive house types & materials result in a lack of character. Focus on privacy diminishes connectedness.	Low density improves air quality and provides space. 'Left over' spaces tend to be low value and sterile.	Densifying areas often characterised by inefficient land use and limited character
Repopulating depleted communities	Communities have often lost public transport connections and local amenities.	Development opportunities exist at or near the centre of smaller, older communities.	Smaller, older places often have a distinct underlying character, but may be in need of TLC.	Smaller communities have higher environmental quality and good access to outdoors.	Bringing life back to depleted communities with low market value.
Development at the edge	Public transport links are likely to be poor, and travel necessary for local amenities.	Land may be greenfield and of wider benefit. Options for autonomous (self-sufficient) housing.	Character may be suburban or rural. Different house types may be needed.	Better environmental quality generally, and good access to outdoors.	Different models for housing and living, with different benefits.

Other changes are less straightforward to make, typically because societal or environmental benefits must be balanced against disbenefits to the end user (e.g. transition to a low carbon heating system that increases fuel bills). For these changes to take place, further research, guidance and support are needed, to establish when such changes should take place, and how.

It is important to distinguish between watering down targets for improvement and providing flexibility for the right change to take place at the right time, and in the right way. Interim standards such as those outlined by UK Government's response to the Future Homes Standard consultation (MHCLG 2021) prolong persistent poor practice, delay a shift towards building better (including change that is needed in the construction industry, the wider marketplace and behaviour at home) and increase the challenge for future generations.

Housing is complex. The interrelated, sometimes conflicting, benefits of better housing make it difficult to provide clear, succinct design guidance. Case studies are one of the best ways to demonstrate how to improve quality. They can be used to drive higher standards by raising expectations, while maintaining sensitivity to context and meeting a particular housing need. Case studies also help the wider public understand what better actually means, in terms of the built environment and the resulting lived experience.

Modern methods of construction promise many benefits including better performance, less waste, increased capacity to build homes, and greater comfort for the occupant. However, they do not promise these benefits at lower capital cost (for now, at least).

Capital cost should not be used as the primary metric for making decisions about when, where and how to build new homes. Homes that perform better will inevitably cost more to build than homes designed and built with an explicit focus on capital cost. However, better homes offer a wide range of benefits in the short, medium and long term. Many benefits have direct or indirect positive financial implications. Benefits are not always easy to understand (let alone measure) but health benefits in particular provide clear financial justification for an agenda that goes beyond capital cost.

If focus shifts away from capital cost, there can be a different view of what is 'desirable'. Shared space, amenity and connectedness must be seen as beneficial, not as liabilities. Landscape and ecology should be seen as ways to connect people, not separate them. Constructors must target quality from the perspective of the occupant, not expedience. They must be incentivised to build properly, without cutting corners, or not build at all (which requires a change in procurement methods and reasonable target costs).

Building homes should not be undertaken lightly, or without appropriate guidance. It must be seen as a long-term commitment to future generations as well as existing communities, because it leaves a legacy for many years to come. Perhaps most importantly, the current poverty of ambition pervading housing delivery and the housing market must be replaced with an ambition to build, and behave, better. People involved in the design and construction of new homes should be given support, through best practice learning and expert advice, and encouraged to achieve the highest standards.

HOUSING IN USE

As users, we must raise our expectations in terms of quality. A prolonged national housing shortage and a consistently poor 'offer' from housing providers have led to the widespread acceptance of poor housing quality, in terms of design and workmanship. Homes and neighbourhoods will only meet WFGA aspirations if they are designed and built to higher quality, which in turn requires higher expectations from the end user.

We must also change ingrained behavioural patterns. We must understand that land has an intrinsic value that should not be squandered. We should anticipate the need to make lifestyle changes alongside changes to our homes that save energy, because energy is valuable, and clean energy even more so. And we should expect less convenience. We should be willing to use public transport, and walk to the shops, otherwise local shops and public transport networks will cease to exist.

If housing schemes are to foster a stronger sense of community and include shared spaces with real ecological value, attitudes towards private space must change. While privacy must be preserved, connectedness should also be sought, for all the benefits it brings. More shared places to meet or play inevitably means less private space in terms of gardens, garages and private driveways. For commercial developers to adapt their practice, there must be evidence that this is what people want.

Education is a vital part of encouraging better behaviour, so that people understand the reasons for making changes. The Carbon Literacy Project provides a valuable model for educating communities through peer-to-peer training. The most meaningful impact that education can deliver is a common agenda, which is essential if circular economy principles are to be successfully adopted.

Better decision-making today, in all aspects of housing policy, design, construction and use, will have positive impacts on existing neighbourhoods and deliver clear benefits for local communities, while contributing positively to the wellbeing of future generations.

Collectively we must rise to the challenge of behaving better today, if we are to affect positive change for future generations and transform the national agenda from 'doing less bad' to 'doing the most good'.

Links to case study presentations:

Social housing for families and individuals by Feilden Clegg Bradley Studios <https://tinyurl.com/yyvmcbjn>

Collaborative living for homeless people by Design Research Unit Wales <https://tinyurl.com/3cbj9yzu>

Affordable homes with live | work options by Emmett Russell Architects <https://tinyurl.com/4ap788b7>

Accessible homes for older people by Pentan Architects <https://tinyurl.com/u7udnfv5>

Custom built starter homes by Rural Office for Architecture <https://tinyurl.com/wnn22hc9>

Housing for people with acute needs by the Welsh School of Architecture <https://tinyurl.com/33zjk5vk>

Homes for Future Generations_ seven short essays: in search of better homes and places

2 Contributors

This project relied on collaboration between an extensive group of contributors:

Funding was provided by Welsh Government's Innovative Housing Programme.

Gwynedd County Council acted as **primary client** and provided a **site** for the project.

Particular direction came from:

Craig ab Iago (County Councillor)

Dafydd Gibbard (Head of Housing and Property)

Geraint Owen (Housing and Property development manager)

Cara Owen (Planning manager) and Gareth Roberts (Highways officer)

Ceryl Davies and Olwen Jones (Adult Services)

Grwp Cynefin, a **local housing provider**, acted as an extended client. Points of contact:

Gwyndaf Williams (development manager) and Gwenan Ellis (Adult Services)

The **contributing practices** and project leads were:

Emmett Russell Architects – Tom Russell and Vicky Emmett

Feilden Clegg Bradley Studios – Heidi Day and Nick Hodges

Pentan Architects – Chris Wilkins

Rural Office for Architecture – Will Judge and Niall Maxwell

Welsh School of Architecture (WSA) – Wayne Forster and Ed Green

Simon Lannon (WSA) provided **modelling** of energy, carbon and renewables.

Lee Wakemans (quantity surveyors) provided **capital cost** estimates for the proposals.

The primary contact was Kevin Parry.

The Design Commission for Wales undertook **design reviews**. The panel included:

Carole Anne Davies (coordinator)

Steve Smith (chair)

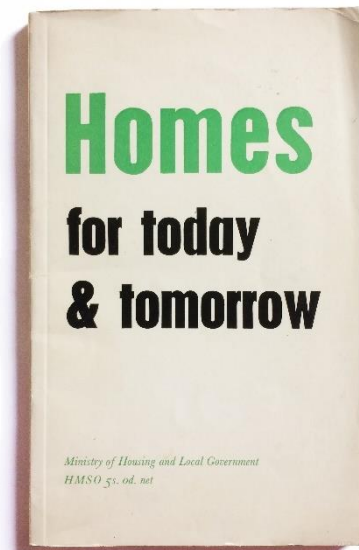
Jen Heal, Chris Jefford and Efa Lois (panel members)

The Future Generations Commissioner's Office also helped to shape the project.

WSA students produced a poster for each WFGA goal, see posters for author details.

3 An introduction to the project

Sixty years ago, in the context of a fundamental need to improve the quality of new housing, the Parker Morris Committee published *Homes for Today and Tomorrow* (MHLG, 1961). The report recommendations, particularly around increasing space standards to meet changed expectations, became a mandatory standard for all new towns and social housing which only ended in 1980, when a Conservative government sought to reduce the cost of housing and, generally, public spending. Today, again, there is a clear need for better housing, but a lack of understanding of how such improvement can be made.



The Well-being of Future Generations (Wales) Act came into force in April 2016. It requires that public bodies think longer term in their decision-making, by working together with people and their communities to create a Wales that we all want to live in, now and in the future. In the same year, the Environment (Wales) Act 2016 put into place legislation requiring that the nation's natural resources be managed in a more sustainable, pro-active, and joined-up way. More recently, widespread recognition of the climate emergency escalated the perceived urgency of decarbonisation and in 2019, the UK Committee for Climate Change stated that Welsh Government should target no less than a 95% reduction in carbon emissions by 2050 (CCC, 2019).

The Welsh housing stock is among the oldest and least efficient in Europe. Of the 1.4 million dwellings that existed in 2017 (StatsWales, 2018), one third were built before 1919, and just 6% were built in the last 30 years. Despite numerous energy efficiency initiatives, almost a quarter of Welsh households reportedly experience fuel poverty, with a significantly higher proportion of homes at risk in the future (NEA 2017). The housing stock currently produces 21% of Welsh carbon emissions (BEIS 2018).

Each year in Wales, less than half the new homes needed are constructed. Low rates of replacement and an underperforming housebuilding sector mean that more than 90% of the homes that exist today are likely to remain in use by 2050 (PPIW, 2015), severely compromising our potential to meet international decarbonisation targets.

There is a clear need throughout Wales for more housing, and for homes that perform better. Planning Policy Wales Edition 10 (December 2018) cites the importance of adhering to WFGA principles, if we are to develop a "vision of the Wales we want" (p.2). The document connects 'good' design with placemaking and positive development.

However, there are remarkably few examples in Wales (or elsewhere in the UK) of 'good' housing that meet the holistic goals established by the WFGA.

“The UK is heavily dependent on a handful of volume housebuilders motivated by short-term profitability. This model has served us badly. It has, of course, failed to create more than about half the new homes that the country needs. But more fundamentally, it has failed us in the quality of design and placemaking. As well as poor workmanship, abysmal space standards and an absence of investment in innovation and building skills, the major housebuilders have let us down by reneging on promises to include affordable homes.”

Richard Best, foreword to *The Housing Design Handbook* (Levitt et. al., 2019)

Successive economic recessions and a determined focus on technical compliance and cost over quality have taken their toll on new housing. Expectations around capital cost have been driven so low that it is no longer possible to deliver 'good' housing for established notions of capital cost. Consistently poor quality has led to low expectations and a lack of aspiration, and self-reinforcing cycle of mediocrity.

At this time, capital cost remains critical in determining whether a project is delivered or not, and severely constrains the potential for quality in the holistic sense. The time has come to change our expectations:

Short term, the Covid19 pandemic and associated lockdown has forced people to think more carefully and in new ways about the place they call home. The capacity and flexibility of our homes have been tested, and many of us have considered how we might live differently in the future. The national response to the pandemic has also demonstrated our capacity to change behaviour rapidly, revealing a resilience in people that was perhaps not previously recognised.

Medium term, the benefits of better quality homes and places must be prioritised over short-term expedience, according to both WFGA and the Environment Act. For legislation to be satisfied, we must produce housing that focuses not on capital cost but on the wider, future benefits for occupants, their neighbours, the surrounding community, and the nation as a whole.

Longer term, there will be strict penalties for Wales if international decarbonisation targets are not met. The future implications of climate change are still being deciphered, but any discussion of future housing models must respond fully to the climate emergency, both in terms of the technical performance of the homes that are built and in terms of the behaviour of the occupants.

To effect change in this context, it is necessary to demonstrate how the seven goals of WFGA can be synthesised through good design, to deliver high quality homes and neighbourhoods that meet the aspirations of the Act holistically – now and in the future. That challenge is the focus of this report and the associated design work.

3.1 Aims and objectives

The HFFG project aims to demonstrate how the seven goals enshrined in the Wellbeing of Future Generations Act (WFGA – figure 3.1A) can be applied through good design to new housing in Wales, and explore the benefits that should result.

Six design teams were each asked to develop a housing proposal that meets the needs of a particular type of end user. The proposals share a common site in North Wales. The site and surrounding context have attributes that are common to many other locations in Wales, to ensure that lessons learnt are applicable elsewhere. The design teams collaborated on production of a strategy for the whole site, before developing housing proposals that respond to their allocated end user.

The six resulting case studies describe a range of different homes and neighbourhoods that meet the ambitions of both the WFGA and the Environment (Wales) Act, comply with international targets for decarbonisation, and provide high quality places for people to live together. Because they share a common site, the case studies also explore how new forms of housing can be integrated with each other and their wider context, preventing some of the issues that tend to ostracise typical housing developments.

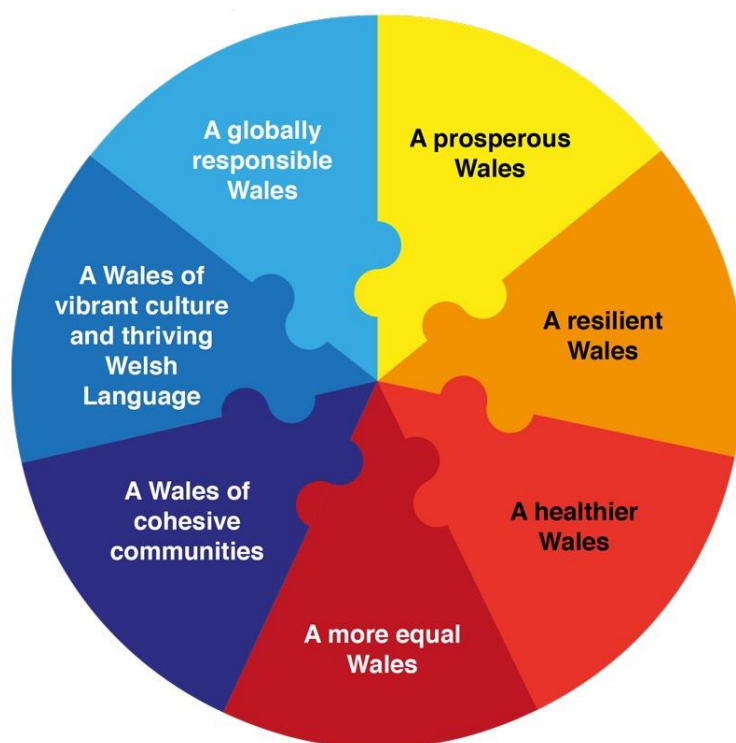


Figure 3.1a

In addition to defining seven WFGA goals (left), the Act identifies five *ways of working* that are key to successful adoption of the Act:

- Long term** needs must be balanced against short term ones.
- Integration** of the objectives of different organisations.
- Involvement** of a diverse range of people representing the wider community.
- Collaboration** with other stakeholders who can help meet key objectives.
- Prevention** to avoid problems occurring or getting worse.

These five ways of working are also key components of the HFFG project.

As part of the research, the proposals were collectively reviewed at key stages. During this process, the project team identified significant issues embedded in the way that housing is typically planned, commissioned, procured and delivered that can make the challenge of designing homes to meet the WFGA goals almost insurmountable.

Seven essays have been produced (one for each WFGA goal) as a means of identifying key issues, and discussing how they might be overcome in the future. Conclusions were then drawn (see exec summary) regarding the nature of change that is needed.

3.2 Method

For the purposes of this project, the WFGA goals were translated into a series of design principles of direct relevance to new-build housing. These design principles were not produced by the Office of the Future Generations Commissioner, but are interpretations of the formal definitions of each WFGA goal. (For the formal WFGA definitions, see <https://www.futuregenerations.wales/about-us/future-generations-act/>).

The design principles (below) provided the collaborating design teams with clear, consistent objectives and a place to start their investigations.

WFGA goal	Design principle
 <p data-bbox="336 730 478 801">A resilient Wales</p>	<p data-bbox="587 696 1362 842">Biodiverse green spaces will connect the site to the landscape via green infrastructure. Dwellings will accommodate changing patterns of use, and be resilient to climate change.</p>
 <p data-bbox="336 853 544 1003">Vibrant culture and thriving Welsh language</p>	<p data-bbox="587 853 1339 999">The proposals will be culturally informed, and will make reference to relevant architectural language. The neighbourhood will support societies, events and activities.</p>
 <p data-bbox="336 1043 523 1115">A more equal Wales</p>	<p data-bbox="587 1010 1362 1155">Various housing needs will be designed for, with a consistent focus on space standards, quality and access for all. The neighbourhood will be inclusive and interconnected.</p>
 <p data-bbox="336 1178 512 1290">A Wales of cohesive communities</p>	<p data-bbox="587 1167 1362 1312">Each vision will have a clear character and strong sense of place. The visions will form a connected community, encouraging social networks and intergenerational activities.</p>
 <p data-bbox="336 1357 528 1429">A prosperous wales</p>	<p data-bbox="587 1323 1378 1469">Homes will be carbon negative in operation. Use of locally available, low carbon materials will be maximised. Techniques employing local systems or people will be prioritised.</p>
 <p data-bbox="336 1514 488 1585">A healthier Wales</p>	<p data-bbox="587 1469 1386 1615">Homes will be affordable to heat, built of healthy materials, and will connect users to the outdoors. The neighbourhood will support activities that promote health and wellbeing.</p>
 <p data-bbox="336 1648 496 1760">A globally responsible Wales</p>	<p data-bbox="587 1626 1362 1771">All proposals will minimise energy use (less than 35 kWh/m².yr) with a combination of highly efficient building fabric, heat from electric sources and on site renewables to meet demand.</p>

Table 3.2a Seven design principles, developed from the seven WFGA goal definitions

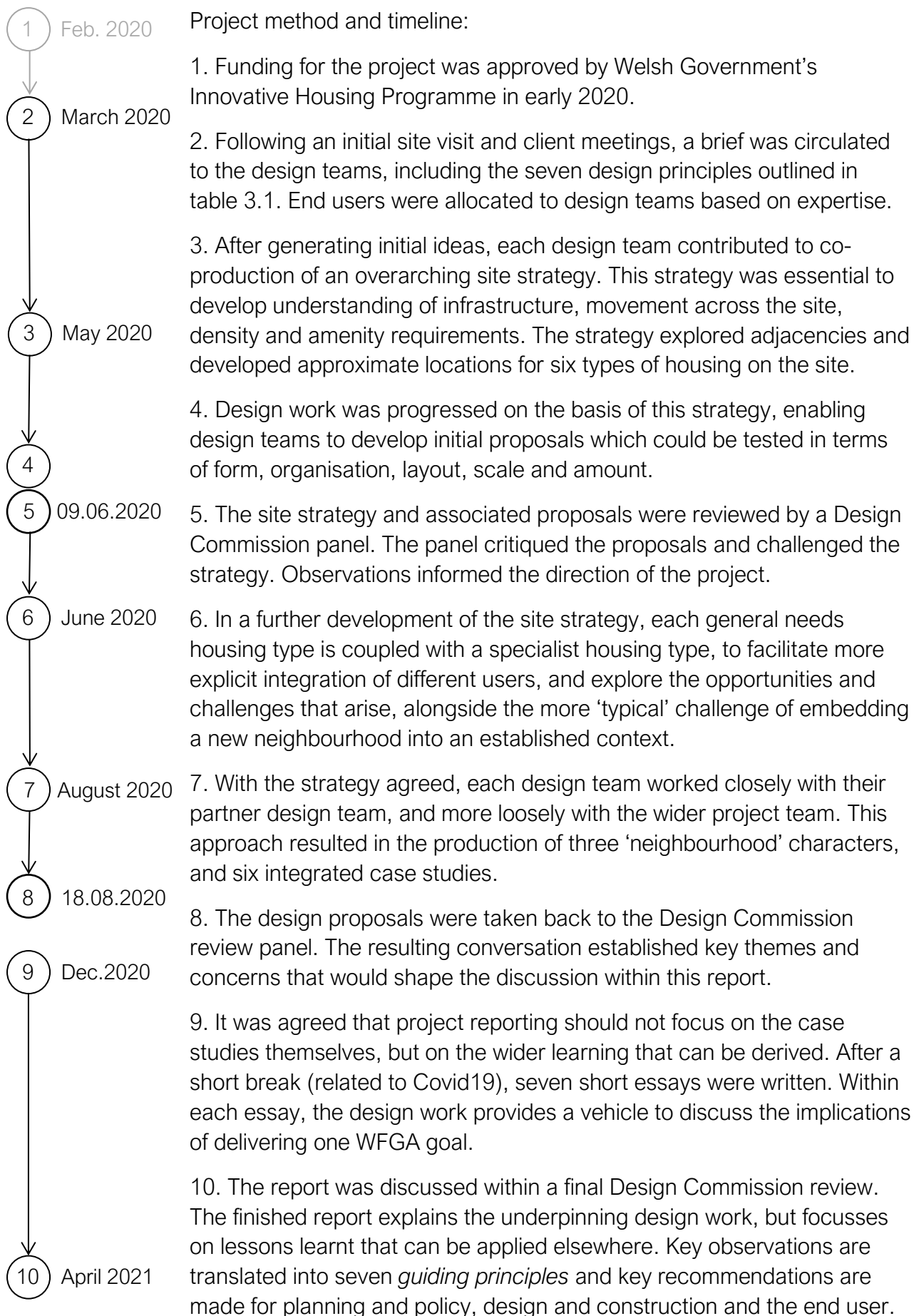
The project set out to deliver a collection of different, connected visions for sustainable housing that meets the WFGA goals (rather than a single ‘silver bullet’, that would not sufficiently account for the inherent complexity embedded in different types of housing).

The intention was that design work would generate case studies relevant to general needs housing and to more specialist types of housing. Housing need was explored with Gwynedd Local Authority and a local housing association (Grwp Cynefin), and each design team was asked to develop housing for a particular user group. The six user groups are listed below (table 3.2b), alongside details of the allocated designer, theoretical client, focus of innovation and proposed dwelling mix.

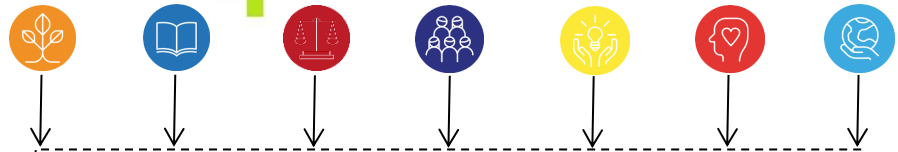
end user	client	designer	focus of innovation	dwelling mix
Social housing for families and individuals	Housing Association	Feilden Clegg Bradley Studios	Homes with capacity for change, set in a biodiverse living landscape.	12 flats and 12 houses
Collaborative living for homeless people	Homelessness charity	Design Research Unit Wales	A combined model for urgent need housing, supported housing and dispersed housing.	6 short stay 6 intermediate 13 gen. needs 1 bed flats
Affordable homes with live-work options	Private sector	Emmett Russell Architects	Flexible, adaptable housing that accommodates change in working practices.	29 live/work units: 17 houses + 12 flats
Accessible homes for older people	Housing association / private sector	Pentan Architects	Fully accessible courtyard houses for downsizers with 'space to grow'.	8x1 bedroom dwellings
Custom-built starter homes	Private sector / coop.	Rural Office for Architecture	A custom-build framework that creates opportunities for self-build, growth + change.	10 flexible houses, 2 apartments
Housing for people with acute needs	Local authority	Welsh School of Architecture	Equitable, accessible homes for all, regardless of differing needs.	10x1 bedroom houses, 4x2 bedroom houses

Table 3.2b: Designing for six different end users (white: general needs, green: specialist needs)

Gwynedd Local Authority provided a single site for the six housing proposals on the edge of Caernarfon – an historic town of around 10,000 inhabitants, with characteristics that are common to many other modest Welsh towns (see Context, section 3.3). Allocation of a site, identification of six end users and development of WFGA design principles together enabled co-production of a working brief and project method, outlined overleaf.



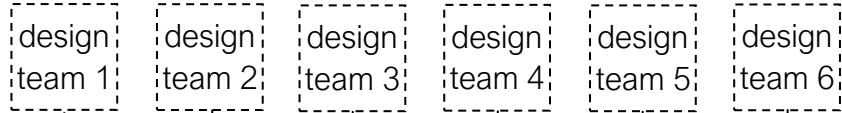
Project structure:



development of seven *design principles* drawn from seven WFGA goals.

client brief: site and need

Six design teams are appointed and provided with the brief. Each team is allocated a housing 'need' to design for.

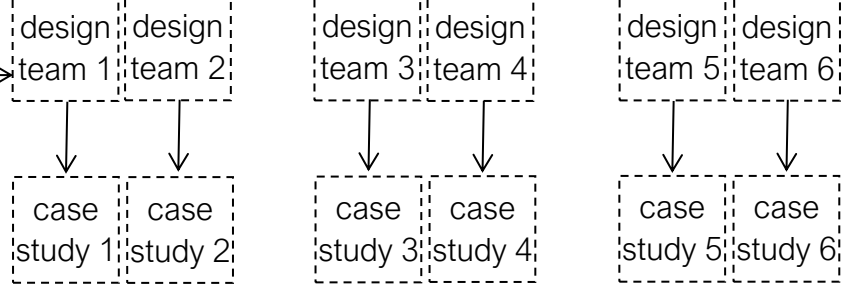


Interim DCfW review, discussion+feedback

Six design teams co-produce a site strategy. Each design team develops an initial response to their brief.

Site strategy refined. Design teams are paired (combining general + specialist needs) for further design development.

Support from energy and cost consultants



Final review of design proposals and feedback. Review establishes key themes for discussion in final report.

Homes for Future Generations report: **"seven short essays"**

- An explanation of the project aims and approach.
- Online presentation of best practice case studies
- Seven essays that explore the implications of delivering housing that meets the seven WFGA goals (and five ways of working).

3.3 Context



The site identified by Gwynedd Local Authority for this project is situated on the eastern side of Caernarfon. Caernarfon is a small town of approximately 10,000 people, located where the Afon (river) Seiont runs into the Menai Strait, the channel of water separating mainland Wales and Anglesey to the north.

The town has a dense, historic medieval and Victorian core located at the confluence of the river and coast. More recent (post War) peripheral growth has spread inland. As a consequence, the town has qualities that make it broadly representative of many Welsh settlements, while also having its own unique character.

The site is located on the eastern edge of the town, between the Maesincla neighbourhood and surrounding countryside (postcode LL55 1RS). The land, 2.4 hectares in area, is predominantly flat with very limited ecological value, and includes some existing buildings and infrastructure of poor quality. The site has been identified for housing in the future in Gwynedd's current Local Development Plan, but any development is currently constrained by a lack of capacity in the local drainage system.

The earliest Ordnance Survey maps describing the site and surroundings are from 1888. They describe it as agricultural land about 500metres outside of the Victorian town curtilage. Immediately south of the site is a small village called Maes-Ingle. See figure 3.3A, overleaf.

Between 1953 and 1963, land to the north, west and south of the site was developed into the current Maesincla neighbourhood. This estate consists of predominantly two storey family houses and a modest proportion of flats. In addition, a primary school and some small scale commercial properties were built to the south and west respectively. At this time, the site itself remained undeveloped, bisected by a simple land drain running across the site into a brook to the east. See figure 3.3B, overleaf.

Around 1965, the decision was made to develop the site, with the existing 'Frondeg' care home in the south-western corner, a library in the south east part of the site, and office buildings in the central and north eastern areas. Areas of hard standing, probably used as car parking, were established on the central, western and far northern areas of the site.

By 1989, the office buildings on the north and central parts of the site had been demolished, and these areas are now composed of rubble and rough grassland. The other buildings remain in their current locations. More recently, a number of temporary buildings have been located on the central area of the site. Some of these remain in use, along with the Fron Deg care home.

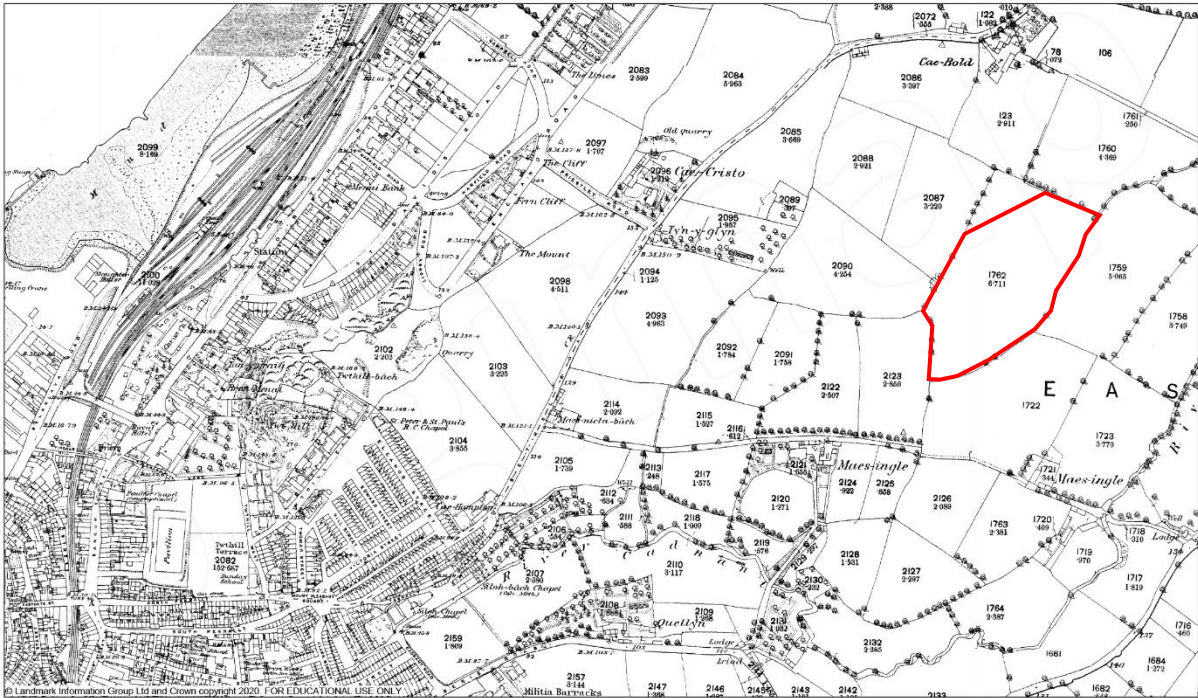


Figure 3.3a: Ordnance Survey map of site and surrounds circa 1880

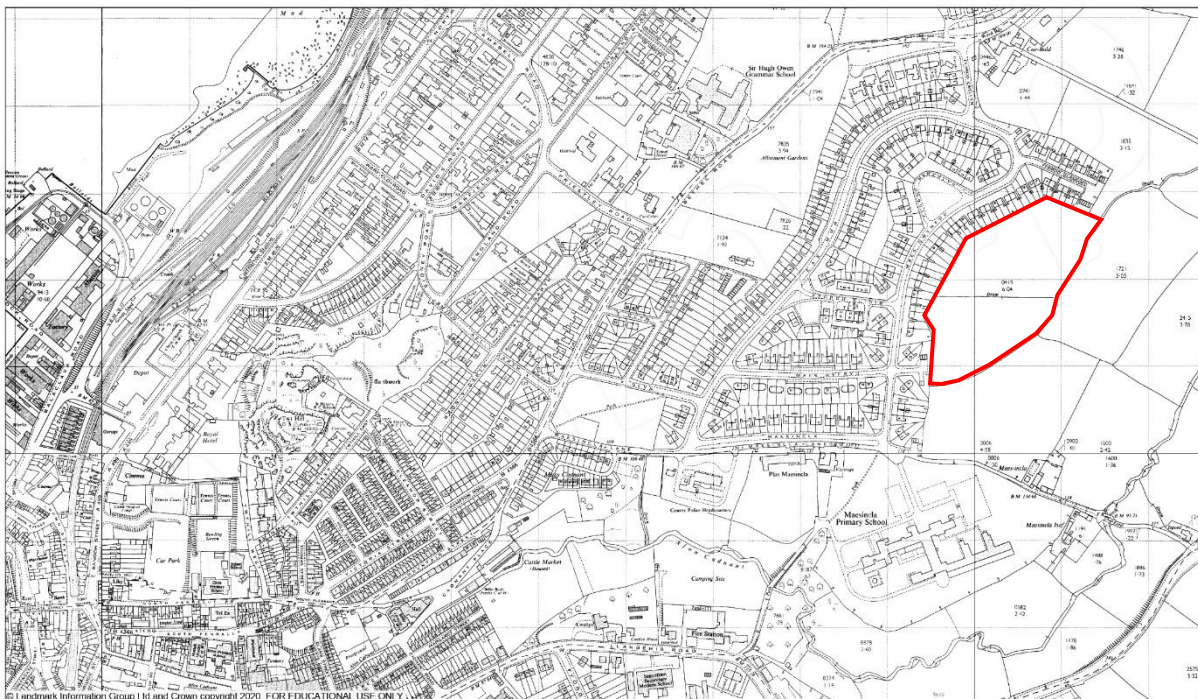


Figure 3.3b: The same area according to Ordnance Survey maps in 1960

Both images reproduced courtesy of Digimap.

© Crown Copyright and Landmark Information Group Limited (2021). All rights reserved. (1880, 1960).



Figure 3.3c: existing Fron Deg care home

The Frondeg care home located at the southerly entrance to the site (fig. 3.3c) provides homes for adults with acute needs, but the building is no longer fit for purpose. The site entrance itself is dominated by the tarmac road, sterile grassed verges and palisade fences located along the site boundaries (fig. 3.3d).

Estate roads and associated verges dominate the southern half of the site. These roads, combined with poor quality low-lying buildings that do not engage with their surroundings, give the overall impression of a poorly designed business park or industrial estate. There is little provision for pedestrian movement.

The surrounding post-war estate consists of semi-detached wide frontage houses, arranged in suburban estate roads at low density. The adjoining homes (fig. 3.3e) establish a consistent edge along the westerly and northerly site boundaries, but deep gardens keep overlooking and overshadowing to a minimum.



Figure 3.3d: entrance to the site



Figure 3.3e: adjacent properties backing onto the site

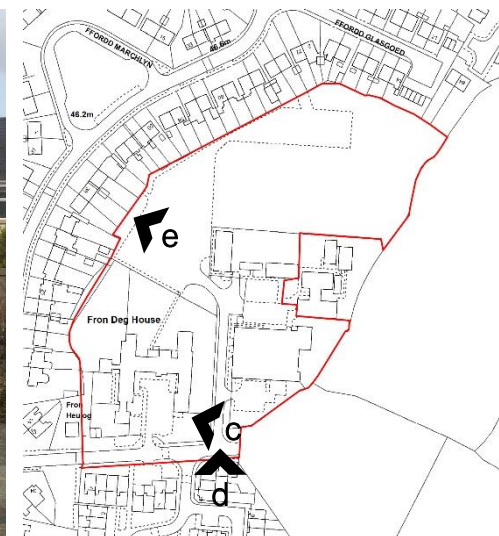




Figure 3.3f: privately owned, extended homes to the north

Many of the surrounding dwellings are now in private ownership. Some have been extended considerably, resulting in some variety of form and architectural language.

Some of the existing buildings on site were conceived as temporary buildings (fig. 3.3g). While they are low-lying, their impact is consistently negative. Materials are poor quality and engagement with place is very limited. Much of the cleared site has become overgrown, but the ground condition (mostly broken hardcore and rubble) limits the degree to which ecology can take hold.

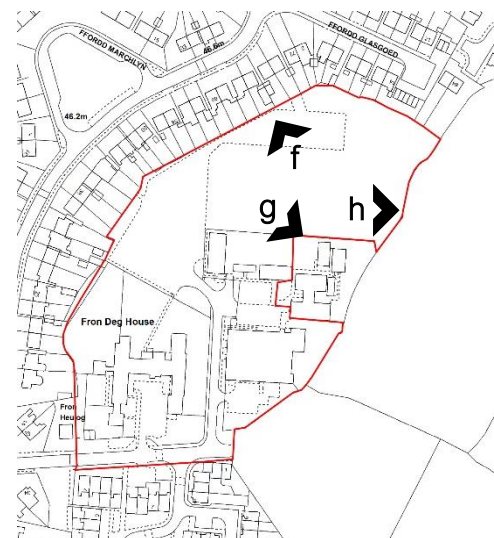
Spectacular views across open countryside towards Snowdonia to the east are positive characteristics of the Maesincla site. The edge of settlement location and topography provide a real opportunity to utilise both outstanding views and connections to the surrounding countryside to great effect. Failure to do so could result in proposals having a detrimental impact on the existing community.



Figure 3.3g: Temporary buildings on site



Figure 3.3h: Views east towards Snowdonia

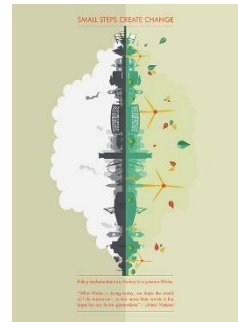


Homes for Future Generations_ seven short essays: in search of better homes and places

4 Seven short essays

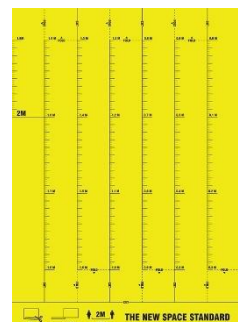
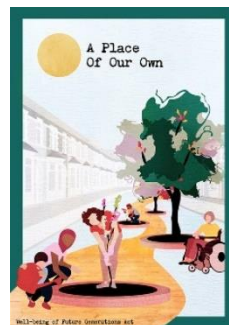
Essay 1. Planning for sustainable homes

WFGA: a resilient Wales



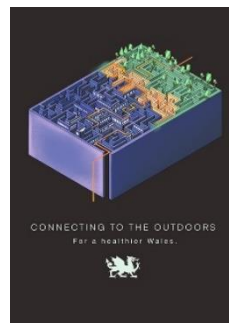
Essay 2. Speaking the local language

WFGA: a Wales of thriving culture and language



Essay 3. Equity before equality

WFGA: a more equal Wales



Essay 4. Sharing space - is hell other people?

WFGA: a Wales of cohesive communities

Essay 5. Signs of growth – building for recovery

WFGA: a prosperous Wales

Essay 6. The benefits of building better

WFGA: a healthier Wales

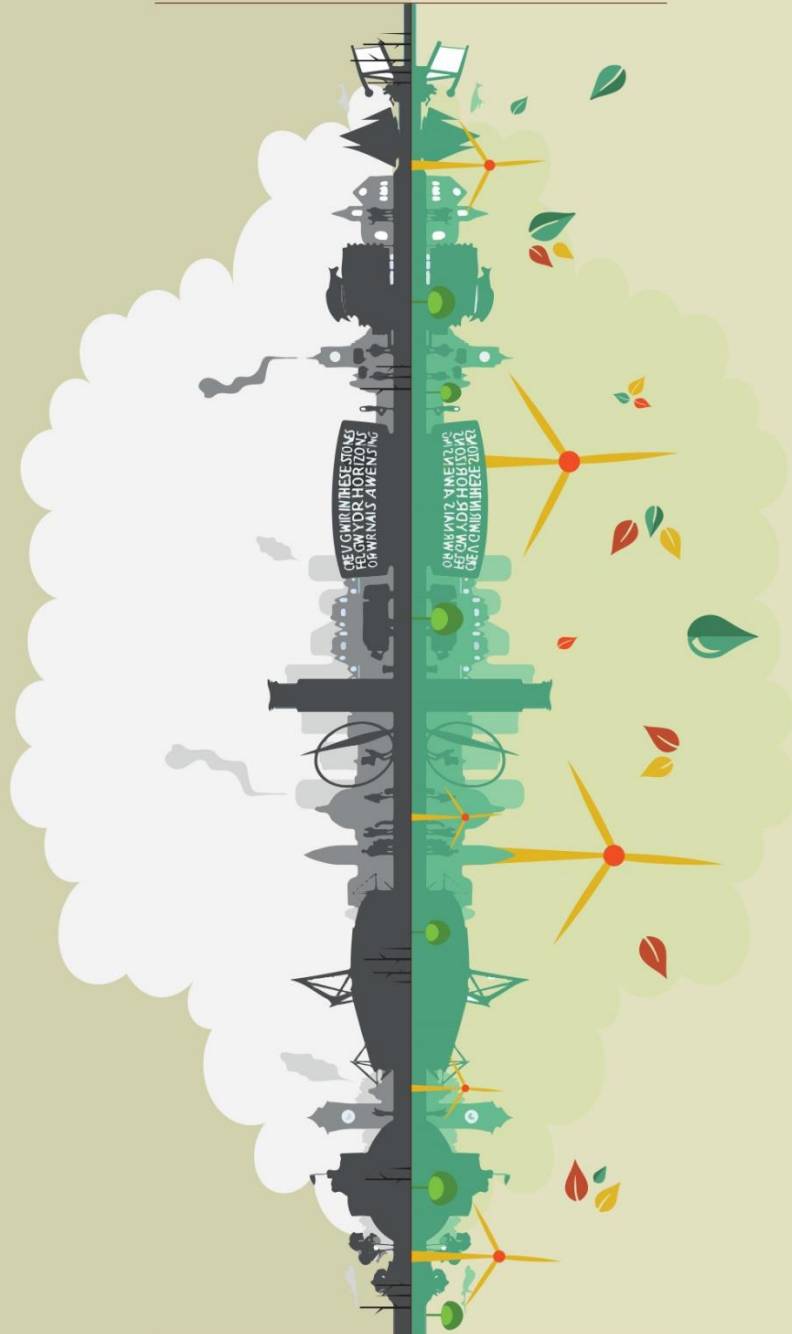
Essay 7. The challenge of behaving better

WFGA: a globally responsible Wales



Posters designed by WSA students, Oct. 2020. See full page spread for credits.

SMALL STEPS CREATE CHANGE



Policy implementation is the key to a greener Wales.

"What Wales is doing today, we hope the world will do tomorrow - action more than words is the hope for our future generations" - United Nations

Poster 1: *a resilient Wales*

Designed by WSA Year 5 students Salma Aitali, Alex Davies and Olly Ridgley

Essay 1:

Planning for sustainable homes



“In the midst of a global pandemic, it is now more important than ever to take unprecedented and coordinated global action to halt and start to reverse the loss of biodiversity and wildlife populations across the globe by the end of the decade, and protect our future health and livelihoods. Our own survival increasingly depends on it.” Marco Lambertini, Director General, WWF (WWF 2020,1)

This year saw the publication of the World Wildlife Fund’s thirteenth biennial *Living Planet Report* (WWF 2020,2), one of the most comprehensive measures of global biodiversity. It reports that global populations of mammals, birds, amphibians, reptiles and fish have, on average, diminished by two-thirds since 1970. It cites the main cause of this dramatic decline in species population as habitat loss and degradation, and connects the same environmental destruction with the emergence of zoonotic diseases such as COVID-19.

The WFGA goal: *a resilient Wales* seeks to address the toll that human development is taking on natural ecosystems, by demanding development which “maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change.” (WFGA 1) However, in the face of a housing crisis that has already lasted for three decades, an apparent shortage of ‘developable’ land and a desperate need for more affordable homes, there are clear tensions between the delivery of new housing, the protection of existing habitats, and the promotion of greater biodiversity.

The HFFG project is located on the edge of an existing settlement, a characteristic common to many new housing developments. The site itself is brownfield and of limited ecological value, being mostly hardstanding and overgrown rubble. However, it is adjacent to open countryside. While some of this countryside is agricultural, the site nevertheless provides a link between an established community and a setting of much greater ecological value. It is also notable that the site has insufficient drainage capacity to meet any increases in pressure that might result from its development.

To address these issues, it was agreed that green corridors would permeate the proposals, connecting all parts of the site to the established countryside (to the east) as well as the existing community (to the west). These green corridors take many forms, from domestic sized water gardens, raised beds and allotments, to shared gardens and a modest orchard. They establish diversity and connectedness, which are critical if the development is to provide genuine ecological value. Through a network of swales and water gardens, they also provide sustainable urban drainage (SUDS) for the site as a whole – see strategic site plan, overleaf.



Figure 4.1a: Diverse, connected green corridors permeate the proposed site plan

Larger shared green spaces expand the green corridors, creating memorable places. In the southerly half of the site, a generous open meadowland (A) connects two green corridors, offering a meaningful ecological sink as well as space for recreation, exercise and play. An adjacent greenhouse and allotments enable the community to act as caretakers. In the middle of the site, one or more of the green corridors could be extended (B) to make a new connection into the existing Maesincla community, increasing the social value of the shared spaces provided by the project. To the north of the site, the existing 'backs' are connected to establish wandering, informal shared gardens (C), and a positive aspect for new and existing residents alike.

The six housing proposals are potentially quite disparate; each was designed to meet a particular housing need and strives to establish its own character and sense of place. The project brief challenged the designers to develop dwelling types that could usefully be applied elsewhere, and their proposals reveal limitations of a pattern-book approach.

The network of green corridors and associated spaces knit the housing together by establishing a single site-wide strategy. The primary focus of these measures is the creation of a rich, biodiverse development with diverse shared spaces for the community and connections that extend beyond the site boundary (see fig. 4.1a, 'B' and 'D' - where sterile public realm could be replaced with connected, valuable amenity).

This legible network of paths and lanes is easy to navigate and has an inherent focus on the pedestrian over the vehicle, ensuring a highly permeable neighbourhood. (Only the central road running north-south perpendicular to the green corridors offers free movement for vehicles.) By celebrating their difference, green spaces collectively offer a diverse range of places with real amenity value - for organised community activities, for exercise and for informal private gatherings. As a sustainable drainage network, it reduces pressure on local infrastructure, and enables development of the site.

Mental and physical health benefits will inevitably come from this more innate connection between built environment and ecology (see essay 6). Furthermore, the widespread presence of greenery and an improved aspect from each home, including views out into the surrounding countryside, are very tangible benefits - if difficult to measure.

However, delivery of a green, connected, biodiverse neighbourhood with sustainable infrastructure does not come without cost. To deliver the measures described above, and maintain reasonable densities (between 30 and 50 dwellings per hectare), the following concessions were made:

- More dense forms for housing were pursued. This did not mean tall buildings, but typically dwellings arranged more closely – often in rows or terraces - with priority given to useful space to the front and rear of dwellings rather than sterile slips of space to the sides.
- Barriers were diminished between adjacent dwellings, and between private amenity space and the public realm. Lanes were used in place of streets for less trafficked areas, with narrower carriageways and an attendant focus on the pedestrian. As a result, distances between habitable spaces often fall below the established planning norm of 21metres. (Where this occurs, design measures have been put in place to obviate loss of privacy.)
- Less space was provided for car parking. Typically, one parking bay was allocated to each dwelling, with a modest amount of additional space allocated for visitors, parking bays for drivers with mobility issues, staff parking etc. Some convenience was also sacrificed in terms of the vehicular servicing of public / commercial spaces and live / work units.

Almost certainly the most impactful concession was the reduced car parking provision. To provide 'typical' levels of car parking as prescribed by the Wales Parking Standard (CSS Wales, 2008), the provision would need to be uplifted to 1 space per bedroom (to a maximum of 3 spaces per dwelling). This level of parking is currently required in all locations throughout Wales (zones 2-6) other than 'city core' (zone 1 – reserved for the largest city centres only).

The impact of adopting this standard on the ecological strategy outlined here is disastrous – more than half of all ‘green’ or ‘shared’ space must be replaced with hardstanding for cars. Either green spaces become very thin, continuous margins with limited ecological value, or a small number of larger green spaces are retained, but their connectedness is lost, dramatically reducing their value.

This tension between car parking on the one hand and amenity, ecology and biodiversity on the other is not easy to resolve. The context for this project is representative of much of Wales, being located at the edge of a modestly sized town with mediocre public transport links. For most households seeking to live in this area, ownership of two cars would be entirely normal. This does not mean that providing less parking is untenable, but for the neighbourhood to be successful a reduced parking provision would need to be offset by improvements such as shared ‘pool’ cars, better local amenities, provision for cycles and most importantly better public transport.

Clearly one of the impacts of a reduced parking provision is an impact on convenience for occupants, and there is a tendency to justify high levels of parking with evidence that households have more than one car, and the propensity for parking on-street when sufficient dedicated space is not provided for cars. Behaviour change is a subject explored later in this report (see essay 7), but it is not only occupant convenience that drives current levels of parking provision and associated infrastructure.

It is understandable that Local Authority planning and highways officers rely on the Wales Parking Standard, but the standard’s distinction between city core (zone 1, one space per dwelling or less) and all other contexts (zones 2 to 6, one space per bedroom) is a very blunt one. More nuanced guidance would allow a wider range of approaches to be developed, responding more sensitively to the specifics of a particular context (e.g. a brownfield site in a small, desirable town with good public transport links), and accommodating different configurations of home, amenity and ecology.

Developers choose to maximise parking provision, because it is assumed to be desirable, and adds value in a way that (presumably) front gardens or shared amenity do not. Social housing developers and private developers alike tend to avoid developing shared amenity because it places a maintenance burden on the landlord, or generates a service charge for residents. In contrast, traditional parking bays require very little maintenance.

Perhaps most significantly, this tension raises the question of site suitability. We should be looking to deliver homes within more sustainable communities, where the onerous Wales Parking Standard becomes unnecessary... or accept that housing density (and therefore land use) in less sustainable locations will be markedly different from the density of housing in our towns and cities.

Sheltered communal gardens occupy the spaces between 'backs'.

Planted front gardens create defensible space between dwellings and the street.

Water gardens connect to swales to provide SUDS along the front of homes.

Raised planters provide places for the community to grow food.

A public meadow occupies the centre of this part of the site.

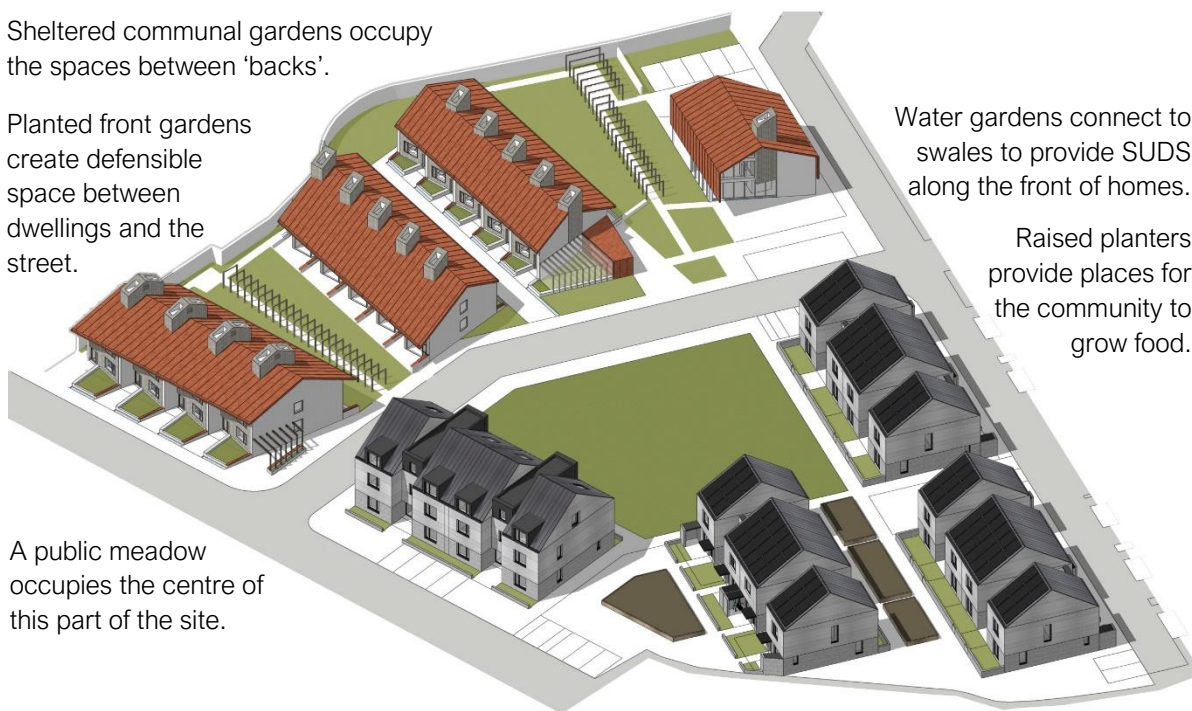


Figure 4.1b: Two types of housing (located on the southerly part of the site) deliver a variety of connected, green shared spaces by pushing car parking to the perimeter.

The above axonometric describes how two different types of housing are configured to deliver a range of different, connected green spaces. During the project's development, concerns were raised around the maintenance of such an extensive provision of communal spaces. There is abundant evidence of the failure of public or shared 'green' spaces without a clear owner who is responsible for maintaining them. Similarly, SLOP (space left over after planning) tends to be developed out by social housing landlords, partly to offload responsibilities for maintenance and partly to avoid providing locations for antisocial behaviour. For shared spaces to be successful (and desirable) in the long term, it must be clear who they are for, and who will look after them.



Figure 4.1c:

Streets running between the general needs housing are designed for pedestrians and for growing, with raised planters and water gardens. See essay 4 and FCBS' *family housing* case study.

There are clear benefits related to the provision of more / better shared spaces, and the reduction of boundary walls and other barriers that diminish connectedness. These include the potential to strengthen intangible qualities such as sense of community. But success is reliant on membership of the community being desirable, and on maintenance of the community being affordable – in terms of financial cost, but also in terms of time and resources.

Figure 4.1d:

Informal shared spaces provide opportunities for everyday life to unfold, offering places to play, socialise and gather as a community. See essay 5 and ROA's *starter homes* case study.



In *Critical Path* (1982), the author, engineer and inventor Buckminster Fuller cited Francois de Chardenedes' view that “it costs nature well over a million dollars to produce each gallon of petroleum”, but that we squander the inherent value of this resource in the way that we use it. Similarly, there is enormous untapped value in the land at our disposal. That is not to say that the capital cost of land should be higher, but that those of us involved in developing it for human use should be tasked with ensuring that the resulting development has real and sustained value, beyond providing sufficient space for us to sleep, and park our cars.

In contrast, each home that is built to current ‘good practice’ adds to the burden we are placing on the wider environment, and commits that particular parcel of land to do nothing for ecology, for community or for diversity for the next hundred years or so. The Wildlife Trusts have collectively condemned the government’s white paper *Planning for the Future*, for increasing the threat to ecology and doing little to promote the integration of people with nature (Williams, 2020). They have proposed a “rewilding” of the planning system, along with a new *Wildbelt* land protection designation to ensure that ecological recovery and access to nature be considerations in all decision-making.

Development strategies that reduce emphasis on the car do exist, and their benefits are known. Indeed, much of the denser (often Victorian) terraced fabric of UK towns and cities provides precisely one parking space per dwelling. At the turn of the century, UK Government invested £30 million in the Home Zone Challenge, funding more than 60 schemes to explore the benefits of reducing the dominance of cars on UK streets. Schemes ranged from simple traffic calming measures through to more comprehensive whole-street strategies in keeping with the Dutch ‘woonerf’ concept¹ including level carriageways, shared surfaces, extensive planting and visual breaks in driver sightlines.

Co-housing schemes, typically designed by (or with) the intended residents, commonly restrict car parking to the perimeter of the neighbourhood. The LILAC housing scheme in Leeds has a car-free zone at the centre of the neighbourhood. Car parking is replaced with meaningful space for amenities with community and ecological value, and only 10 parking spaces are provided across the whole site (0.5 per dwelling, see website <https://www.lilac.coop/>). Car sharing schemes are often embedded in such neighbourhoods, to further reduce the number of cars and the need for parking.

“If you invite more cars, you get more cars. If you make more streets better for cars you get more traffic. If you make more bicycle infrastructure you get more bicycles. If you invite people to walk more and use public spaces more, you get more life in the city. You get what you invite.” Jan Gehl in conversation, 2019

The lockdown resulting from the Covid19 pandemic shone a light on the damaging effects of urban environments – including congestion, pollution (particularly nitrogen dioxide from motor vehicles, a known cause of respiratory problems) and lack of green space. Different strategies are needed to improve dense urban environments, but they also present different opportunities.

Swansea City Council and Natural Resources Wales (NRW) have been working with the Green Infrastructure Consultancy to develop a Green Infrastructure Strategy for the city centre². The strategy is promoted as a cost-effective way to address the impacts of climate change while delivering other benefits including increased biodiversity, improved resident and visitor experiences, and increased investment in the city centre.



Figure 4.1e: Picton Yard in Swansea city centre, Powell Dobson Architects

¹ <https://www.restreets.org/case-studies/home-zones>

² <https://www.swansea.gov.uk/greeninfrastructurestrategy>

Outside of the UK, recent development in Barcelona demonstrates how city areas can be transformed to reduce pollution and increase access to green space. The city has pioneered green urban planning since 2016 by promoting the concept of *superblocks*. By tackling a neighbourhood of nine city blocks, traffic can be restricted to major roads at the perimeter, leaving the streets inside free for pedestrians and cyclists. There are many potential benefits of planning for more sustainable neighbourhoods in this way, but there are also consequences. As Anupam Nanda points out, “green city initiatives need to be long-term – and created with the support of local people. Recognition of the benefits of green living and informed support of developments will result in positive behaviour changes by the citizens.” (Nanda, 2020)

It is clear from this discussion that planning for sustainable homes is essential. New homes will not be sustainable, in terms of compliance with the WFGA goals or UN Sustainable Development goals, unless greater consideration is given to the location of housing. Our ecological responsibilities require that we nurture ecological value and biodiversity, but also that we consider the true value, and potential, of land in our stewardship. The tension between our ecological responsibilities and our convenience (in particular space for private amenity and car parking) must be addressed through changes to our expectations as occupants, a more nuanced parking standard, development patterns and densities that consider all of these issues, and different ‘models’ for housing that embed ecology and biodiversity at the centre our neighbourhoods, in a connected way.

“Only by putting the environment at the heart of our decision making can we build a safe and resilient future for nature, people and our planet.”

Tanya Steele, chief executive WWF (quoted in Boyle et al., 2020)

Guiding principle:

Housing should be planned with a focus on people over vehicles, guided by appropriate assumptions about car parking and infrastructure. (Adoption of the Wales Parking Standard typically compromises space for amenity and ecology.) Development should be biodiverse. Ecologically valuable, useful, connected amenity spaces should contribute to a nature recovery network. The ownership, use and character of these spaces should be unambiguous.



Poster 2: *a Wales of thriving culture and language*

Designed by WSA Year 5 students Thomas Bale, Ana Baltac, Anna Krzyzanowska and Timothy MacKlen

Essay 2:

Speaking the local language



“Placemaking is now firmly embedded in planning policy through the 2018 edition of Planning Policy Wales... It places a duty on all those involved in developing or shaping places to embrace the concept of placemaking and a clear link is made between placemaking and wellbeing. This all aligns with the goals of the Wellbeing of Future Generation Act, its goals and the focus on social, environmental, economic and cultural sustainability.”(DCfW 2020)

In 2020, the Design Commission for Wales (DCfW) launched the *Placemaking Wales Charter* in tandem with their report *Places for Life 2*. The Charter requires that “the positive, distinctive qualities of existing places are valued and respected [and] the unique features and opportunities of a location including heritage, culture, language, built and natural physical attributes are identified and responded to.” (DCfW, 2020a)

But what constitutes good ‘placemaking’, and how can it be mandated?

Essay 1 established the importance of integrating meaningful spaces for shared amenity with real ecological value into housing developments, in place of hardstanding for cars, anonymous boundaries and sterile, low maintenance verges. To successfully achieve this, designers require more than simple house types and suburban organisational patterns. Instead, an approach to placemaking must be adopted that determines the relationship between the built environment and its landscape (whether urban, suburban or rural). Three such approaches were tested through the HFFG design work.

To explore the impact of different approaches to placemaking, and maximise the usefulness of this project, the site was broken down into three distinct zones. Each zone takes a different approach to placemaking, accommodating a general needs housing type, and a specialist housing type. The breakdown of housing types is as follows:

zone	general needs	specialist needs	density	amenity
A – an arcadian landscape	social housing for families and individuals	housing for people with acute needs	50 homes/ hectare	outdoor spaces, growing places
B - an artisan quarter	affordable homes with live-work options	collaborative living for homeless people	60 homes/ hectare	market square, shop frontage
C – an informal neighbourhood	custom-built starter homes	accessible homes for older people	35 homes/ hectare	common room

Table 4.2a: Three distinct zones, each of which includes both general needs and specialist housing

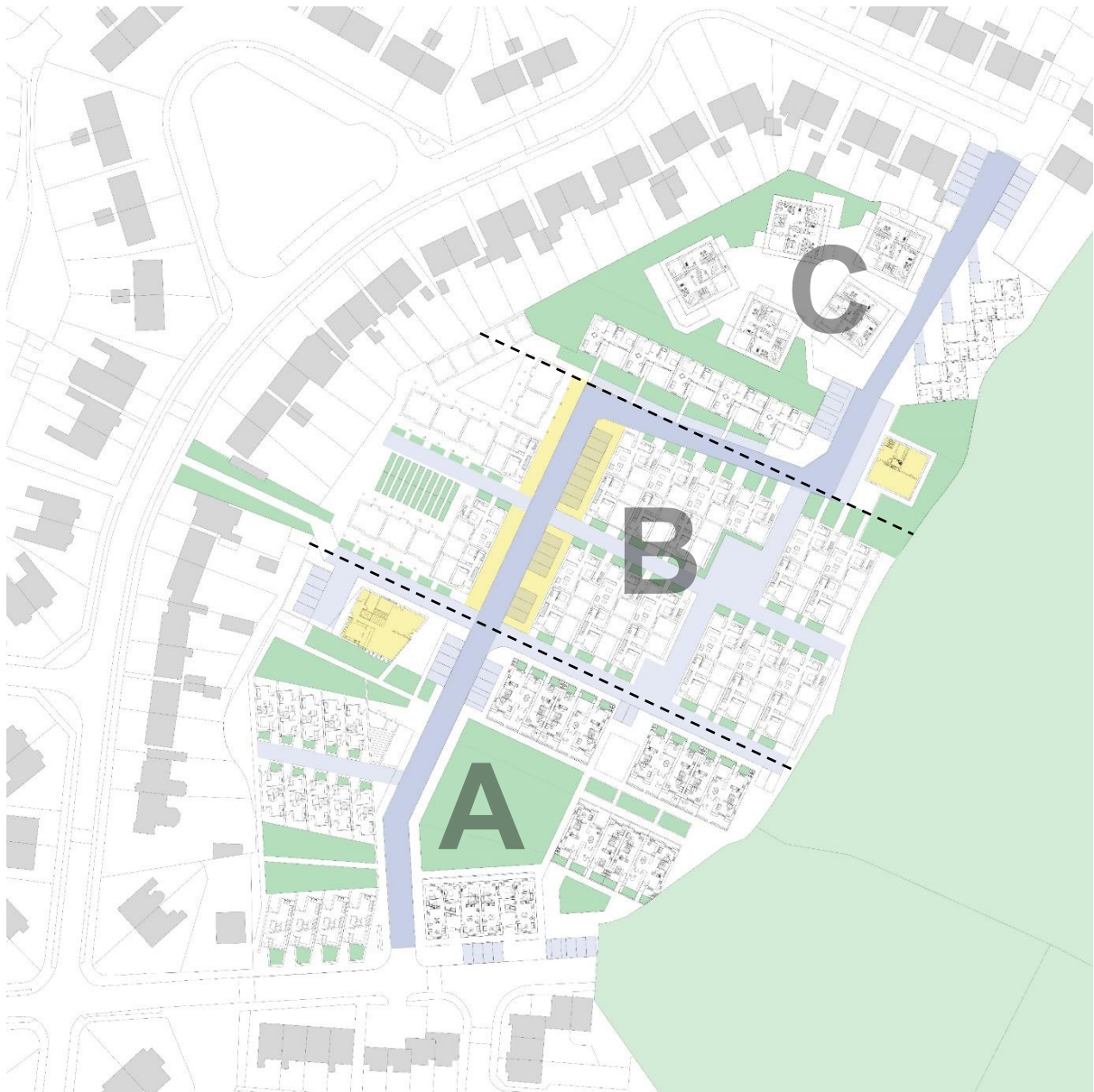


Figure 4.2a: three development 'zones' (A, B and C) with distinct approaches to placemaking

Zone A is described as an *arcadian landscape*. The landscape is a defining characteristic of the neighbourhood. A network of interconnected outside places with clearly defined identities and roles establish sense of place. The role of housing is to frame and bound the landscape, acting as a backdrop for a vibrant, biodiverse setting – a pleasant surprise upon entry from the surrounding suburban sprawl.

Dwellings are arranged in a way that preserves privacy for families and vulnerable people in smaller outside garden spaces, while maximising the landscape that is publicly accessible via the larger spaces. Key outdoor spaces such as a central 'meadow' provide venues for the wider community to enjoy together. Places for rest and play are combined with opportunities to work in and on the landscape (including raised planters, potting sheds and conservatories), in search of a harmonious relationship between people and the natural environment. Ecological value is maximised throughout the neighbourhood, and derives particular benefit from its connectedness.



Figure 4.2b: a meadow provides meaningful amenity space. Housing frames views of the countryside.

Zone B is described as an artisan quarter. Character is defined by a mix of residential and commercial activity, and a hierarchy of public places that encompasses the main arterial street running north-south, smaller lanes running east-west (connecting the existing context to landscape to the east) and tertiary mews with pocket gardens that discretely connect more private moments within the live-work blocks. The market square (figure 4.2a, highlighted in yellow) sits at the heart of this neighbourhood. It provides a forum for the live-work units, and a gathering place for anyone using the main street. Active frontages line the square, animating the street scene.

Secondary streets, designed for people rather than cars, maintain access throughout the neighbourhood. Housing for homeless people also nestles behind the street frontage, enjoying modest shared spaces and sharing a community centre to the south.

Figure 4.2c: live/work units wrapped around mews lanes, shared surfaces punctuated with pocket gardens.



Zone C is an informal neighbourhood. Located in the northern part of the site, it adopts an approach to placemaking that is deliberately ad-hoc. This approach has more in common with the surrounding suburban estate, and also reflects a transition at the very edge of the settlement to a more rural condition. In contrast to the ordered green spaces of Zones A and B, houses are nestled amongst a landscape that borrows its language from orchards and kitchen gardens. Streets are deliberately ambiguous and the informal, natural landscape becomes a defining characteristic of place.

Standalone custom-build homes (arranged in pairs) and later-living units (arranged in rows) share the landscape, which provides amenity space and informal opportunities for gathering. A *common room* provides a focus, and a place to meet the wider community.

By articulating three distinct approaches to placemaking (in particular, the attitude towards the car, amenity, and public realm) the design teams had a clearer sense of the identity they were striving for. House types were developed to meet particular user needs, and deliver a specific relationship between built form and landscape. This imbued the project with a stronger sense of place, a more clearly defined character, and a more successful relationship between private and shared components of the neighbourhood as a whole.



Figure 4.2d: The sloping forms and pitched roofs of the proposed older persons' housing reference the surrounding semi-detached forms and hipped roofs of the Maesincla estate, while also standing out as design elements that generate distinct character and have been given due care.

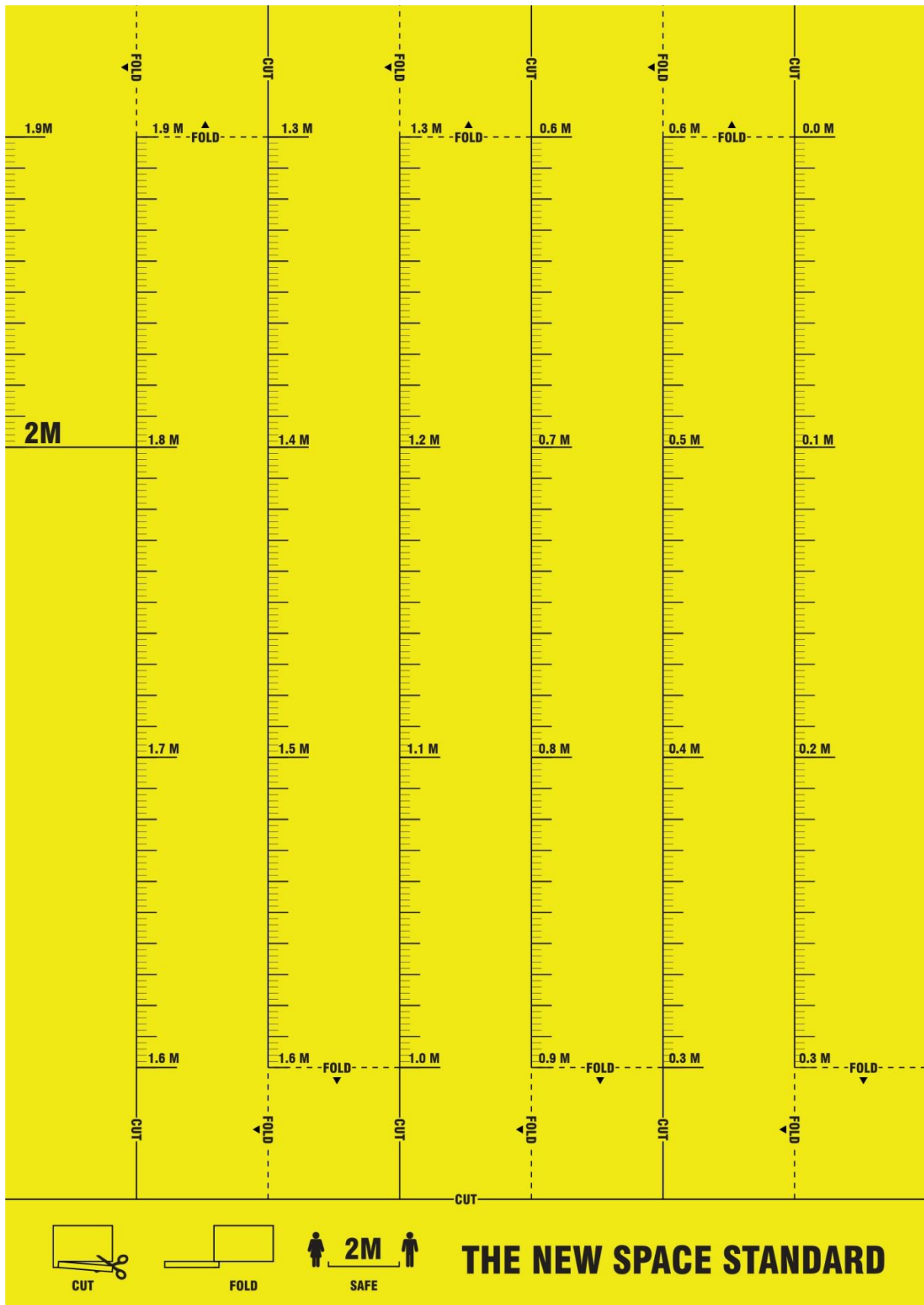
A methodological limitation arose on the HFFG project, because the study set out to deliver a range of distinct types of housing with different approaches to placemaking across a single site (to generate as much transferrable learning as possible). This meant that, individually, proposals did not respond sufficiently to the project's context, but relied on the critical mass of the HFFG project itself. In hindsight, the design teams recognised that any project must develop a specific, contextual response to its geographic, social and cultural location, if new development is to be both distinctive and successfully embedded within an existing community.

“Creating good places demands an informed and critical response to place and context. Only through a considered response to landscape can we make places which are locally distinct, use resources responsibly, take full advantage of the opportunities offered by the site, overcome the challenges of topography and climate and embrace the spirit of a place.”

Amanda Spence and Rhian Thomas (DCfW 2020)

Guiding principle:

Developments should have a clear character and a defined sense of place. (Generic house types tends to diminish these qualities.) The architectural language should be culturally informed and contextually relevant. Neighbourhoods should accommodate societies, events and cultural activities.



Poster 3: a more equal Wales

Designed by WSA Year 5 students Henry Davis, Arista Lam and Kübra Taşkıran

Essay 3:

Equity before equality



Homelessness is arguably one of the conditions giving rise to greatest inequality in Western societies today. In 2007, four experts submitted a report to Finland's Minister for Housing which proposed the elimination of long-term homelessness. They stated that "a person does not have to first change their life around in order to earn the basic right to housing. Instead, housing is the prerequisite that allows other problems to be solved." The report's recommendations were adopted in national policy, and by 2017 Finland had become the only European country to experience a decline in homelessness (Y-foundation, 2017). The underlying principle establishes a key challenge for housing – that good housing should be a basic human right, and that homes should support the changing needs of future generations, not conflict with them.

The WFGA goal: *a more equal Wales* demands "a society that enables people to fulfil their potential no matter what their background or circumstances". In 2020, the impact of different socio-economic circumstances was put under a stark spotlight by the death of George Floyd and subsequent Black Lives Matter movement, as thousands of people took to the streets to challenge systemic racism and inequality. Housing clearly has a part to play in delivering a more equal society - following the Brixton riot in 1981, the Scarman Report identified housing as a particular issue that had intensified tensions within the community. Subsequent positive action programmes resulted in the creation of BAME-specialist housing associations, but initial momentum was lost when many of these were amalgamated into mainstream housing providers, with a consequent loss of specialism or understanding of housing 'need'. Inside Housing's 2019 diversity survey found that 66% of landlords had no BAME representation on their executive teams.

This year, as the world struggled to contain the spread of COVID-19, it was recognised that the pandemic is not a 'great leveller', but instead exacerbates existing inequalities. "People facing the greatest deprivation are experiencing a higher risk of exposure to COVID-19 and existing poor health puts them at risk of more severe outcomes..." (Health Foundation, 2020)

There are various connections between the COVID-related death rate and the areas hit hardest by the housing crisis. Surveys have established a clear link between overcrowded housing and ethnicity in the UK, with 2% of white British households experiencing overcrowding, compared with 15% of Arabic households, 18% of Pakistani households and 24% of Bangladeshi households. (MHCLG, 2020) Links such as this begin to explain elevated infection rates in poorer and minority communities, and highlight the importance of delivering housing that respects the needs and differences embedded within all communities, regardless of background or circumstance.

"We cannot forever rely on disturbances to make progress."

Llewellyn Graham, chief exec., Nehemiah Housing Association (cited in Brady, 2020)

The HFFG project set out to explore how 'good' housing might meet the changing needs of future generations. The project began with the pretext that six different housing needs would be designed for, with a consistent focus on 'more equal homes' – in terms of space standards, quality and access for all. A related aim was that the resulting neighbourhood would be both inclusive and interconnected. As previously outlined, proposals were developed to meet a combination of 'general' and 'specialist' needs, as follows:

- Social housing for families and individuals (general needs)
- **Affordable homes with live | work options** (general needs)
- Custom-built starter homes (general needs)
- Collaborative living for homeless people (specialist needs)
- Accessible homes for older people (specialist needs)
- **Housing for people with acute needs** (specialist needs)

This essay describes two of the proposals (highlighted in bold), to discuss how different needs are met, and the degree to which the resulting homes are more equal (alike) or equitable (fair).



Figure 4.3a: The housing for people with acute needs (including autism and challenging behaviour) attempts to strike a balance between providing shelter and encouraging interaction.

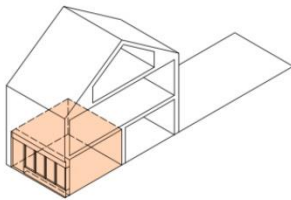
Affordable homes with live | work options

Emmett Russell Architects set out to explore how a neighbourhood can promote greater equality by encouraging effective home working and supporting small businesses. For this approach to be successful, they established that homes must be flexible and adaptable, equipped with appropriate technology and appealing outside spaces.

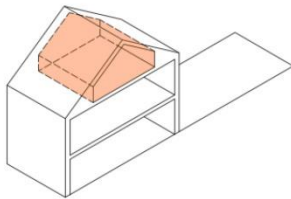
To design homes that offer a range of different opportunities for home-working, they began with four familiar archetypal models for live/work: the shop, the workshop, the study and the shed. Each type offers different relationships between living and working. The table below describes whether work spaces are public facing or private, and whether they are integral to the house, or separate from it:

Table 4.3	integral to home	separate from home
public	shop	workshop
private	study	shed

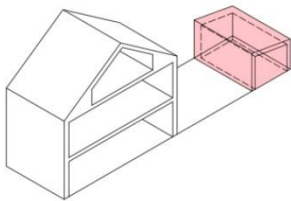
Figure 4.3b



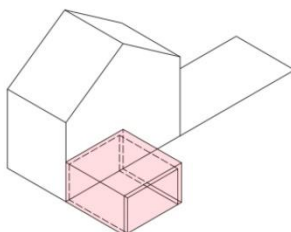
As the front room of a house, the **shop** provides a space for businesses that require a direct public interface. This could be a retail shop, cafe, tattoo parlour or a consulting room. The shop is directly connected to the home. In an era of declining high streets, flexibility and adaptability are key.



The **study** (or home office) is a private space for working within the home. It might be a desk on a landing, it might occupy a spare bedroom or a loft space. The coronavirus lockdown has posed challenges for how areas for home-working can be carved out within our homes and how we can use spaces in multiple ways.



The **shed** provides a retreat from domestic life and a place to focus on something else. When Covid-related lockdowns transformed family houses into home schools, the commute across the garden to a private working environment became an essential retreat for many.



Car mechanic, cheesemaker, carpenter, micro brewery... some small businesses need a space that is separate from the house but accessible from the street. The **workshop** takes the place of a garage, and might share a courtyard with the home. The workshop can sit outside the thermal envelope of the house.

In the resulting proposals, these four house types are combined at a density equivalent to traditional Victorian terraced housing, but with a wider plot width more usually associated with suburban housing. The resulting square courtyard plot (10m x 10m) can accommodate on-plot parking, and external space becomes more closely associated with the house.

Each plot can accommodate two flats or one house with different layouts. The interchangeable dwelling types provide a kit of parts that can come together to form a wide variety of urban forms, either as an urban blocks or as smaller scale infill housing.

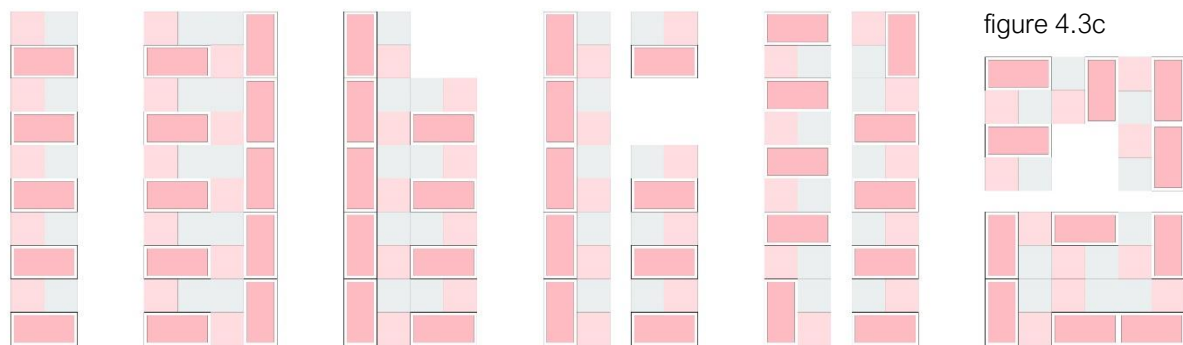
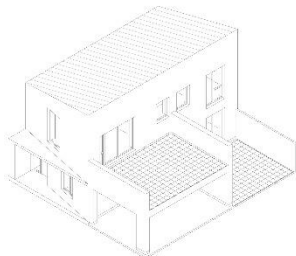
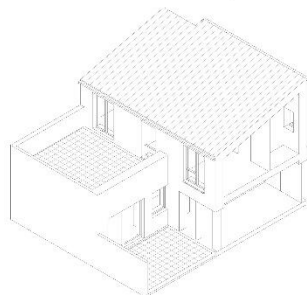


figure 4.3c

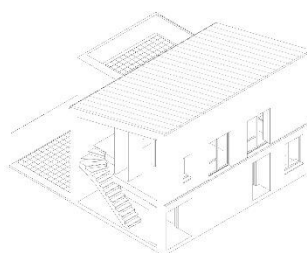
The courtyard dwellings all naturally allow for privacy, provide long views, and offer sheltered amenity space at ground and first floor:



House type 1 takes the form of an upside-down house, with an upstairs living space positioned to make the most of light and views. An integrated garage suitable for parking a car can be adapted into a workspace. Both levels have access to outdoor space, with an enclosed ground floor courtyard garden and upper floor roof terrace.



House type 2 has a more conventional arrangement, with living spaces at street level and bedrooms on the first floor. This means that the living room has a more secluded courtyard garden, and the bedroom accesses a roof terrace. As with House Type 1, a flexible garage / workshop space would be suitable for a variety of work scenarios.



The Flat types provide smaller dwellings with their own front doors onto the street. This promotes a greater sense of ownership, and avoids the need for management of shared space, while creating generous, private external spaces. The ground floor flat has two bedrooms and an open plan living room / kitchen / diner onto a courtyard. The upper floor flat has one double bedroom and an open plan living room / kitchen / diner leading to a roof terrace.

figure 4.3d

Despite being interchangeable, the house types cater for equity rather than equality. A wide range of different types of 'work' can be accommodated across the four types, and each will impact differently on the way the home operates. By sacrificing a garage, a shop or a studio can be gained. Difference is to be supported, even promoted, because of the diversity that will result. But equity is maintained in that each home has the same underpinning space standards and quality of environment, the same approach to flexibility and adaptability, and the same essential relationship with the wider place.

Housing for people with acute needs

By designing housing for people with acute needs, the proposal tests whether good quality general needs housing can provide homes that successfully meet more complex needs.

The brief was developed by Gwynedd Local Authority, who intend to provide new homes for the users of an existing care facility located on the project site, and for a small number of locally-based people with related needs. These users have a wide range of acute needs. Many are autistic, to differing degrees. Some exhibit challenging behaviour. A small proportion also have physical disabilities or mobility issues.

All too often, the brief for 'specialist housing' results in institutional house types that do little to create a sense of home. In the interests of accessibility and flexibility, layouts tend to be open plan and single storey. Character and distinctiveness are sacrificed, to cater for more complex needs. Overall, this results in a strong sense of 'sameness'. Gwynedd Local Authority hope to provide new homes in a way that moves away from institutional models, towards a more domestic approach - promoting independence and fostering a stronger sense of community and togetherness.

People with mental health problems, including autism, operate within a broad spectrum of differences, in terms of both needs and behaviour. To support them, a balance must be found between protection and inclusion. In terms of housing, that means balancing the tension between a sheltering environment and one that creates a sense of belonging within a wider community. (Both attributes are positive characteristics for housing generally.) Part of the success of any specialist housing scheme lies in it being connected to a wider community, not segregated in a ghetto.



Figure 4.3e

Here, specialist housing is combined with general needs housing (A) to define a sequence of connected gardens. Some are public, others more private. Connections are made between homes knit tightly into rows and their neighbours, across a shared street on one side or a garden courtyard on the other. Wider connections are made through a growing space (B) and a community centre (C). Key facilities are shared with housing for homeless people to the north (D), increasing their usefulness. The centre hosts a range of activities and events, and facilitates bigger gatherings - connecting users with their wider community.

To manage challenging behaviour, controls not normally evident in housing design are needed. This might mean flexible or adaptable connections between rooms, or between the home and more public spaces outside (e.g. street or garden). Provided thoughtfully, this could enable any occupants to adapt their home to suit changing needs. However, for flexible or adaptable elements to be successfully employed, it must be possible to make changes with a minimum of cost, time and specialist skills.

People with physical disabilities are confounded by barriers that able bodied people overcome without thinking. In purpose designed housing, 'fully accessible' tends to lead to diminished spatial richness and a less developed character or identity. Designed correctly, spatially rich, sensitively organised housing can be made fully accessible, but this tends to add to the size and cost of the dwelling.

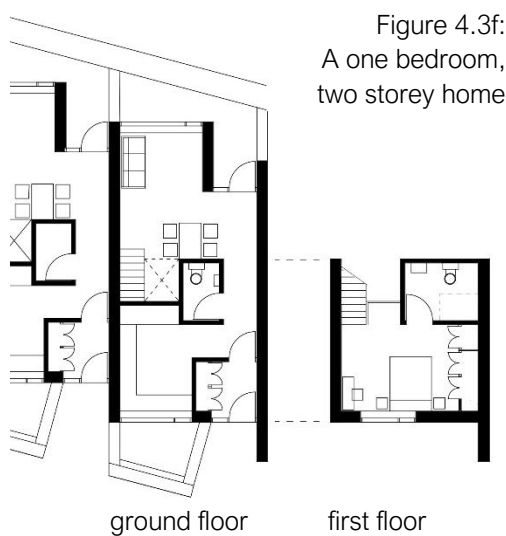


Figure 4.3f:
A one bedroom,
two storey home

These houses are designed to be fully accessible, with a generous straight-flight staircase (simplifying stairlift installation) and a structural opening ready for a platform lift. Each living space is distinctive, and designed with specific functions in mind. A modest dining space means that there is always a table to sit at. Kitchens can be separated from the rest of the house if necessary. Bathrooms are spacious and arranged ensuite to bedrooms, to maintain dignity for users needing more help. Plenty of storage is provided throughout - to minimise clutter, reduce anxiety, and help residents to stay organised.

The resulting homes are undoubtedly generous - the layout shown above consumes the same space as a conventional 2 bedroom flat. But despite being suitable for many of the users identified by the Local Authority, and true 'lifetime homes' in the sense that they will cater for a wide range of mobility issues, they still fail to cater for the most acute needs presented by the proposed end users.

The design work revealed, and struggled to overcome, a tension between what the commissioning project team 'wanted' to deliver, and the level of support that they feel is 'needed' by some users. Desires for a de-institutionalised, domestic environment are at odds with a setting that facilitates the highest levels of support and supervision.

Homes for people with acute needs do not need to be substandard in terms of design, or the quality of spaces and sense of neighbourhood that result. They can also, simply, be better places to live. However, it is clear from the study that there are limits to the applicability of even the most flexible housing 'types'. A critical part of delivering the right housing is developing a clear understanding of both aspirations and needs, and any potential conflicts that exist, as soon as possible in the design process.

Raised above the street, a cosy bedroom provides respite and a quiet retreat.

Oversailing roofs and raised planters establish ownership of both street and garden.

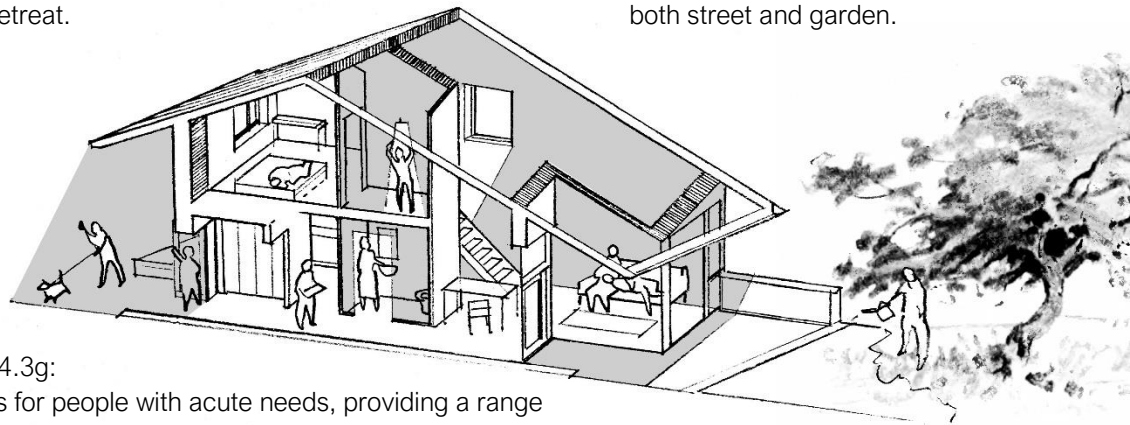


figure 4.3g:
Homes for people with acute needs, providing a range of spaces that are both interconnected and distinct

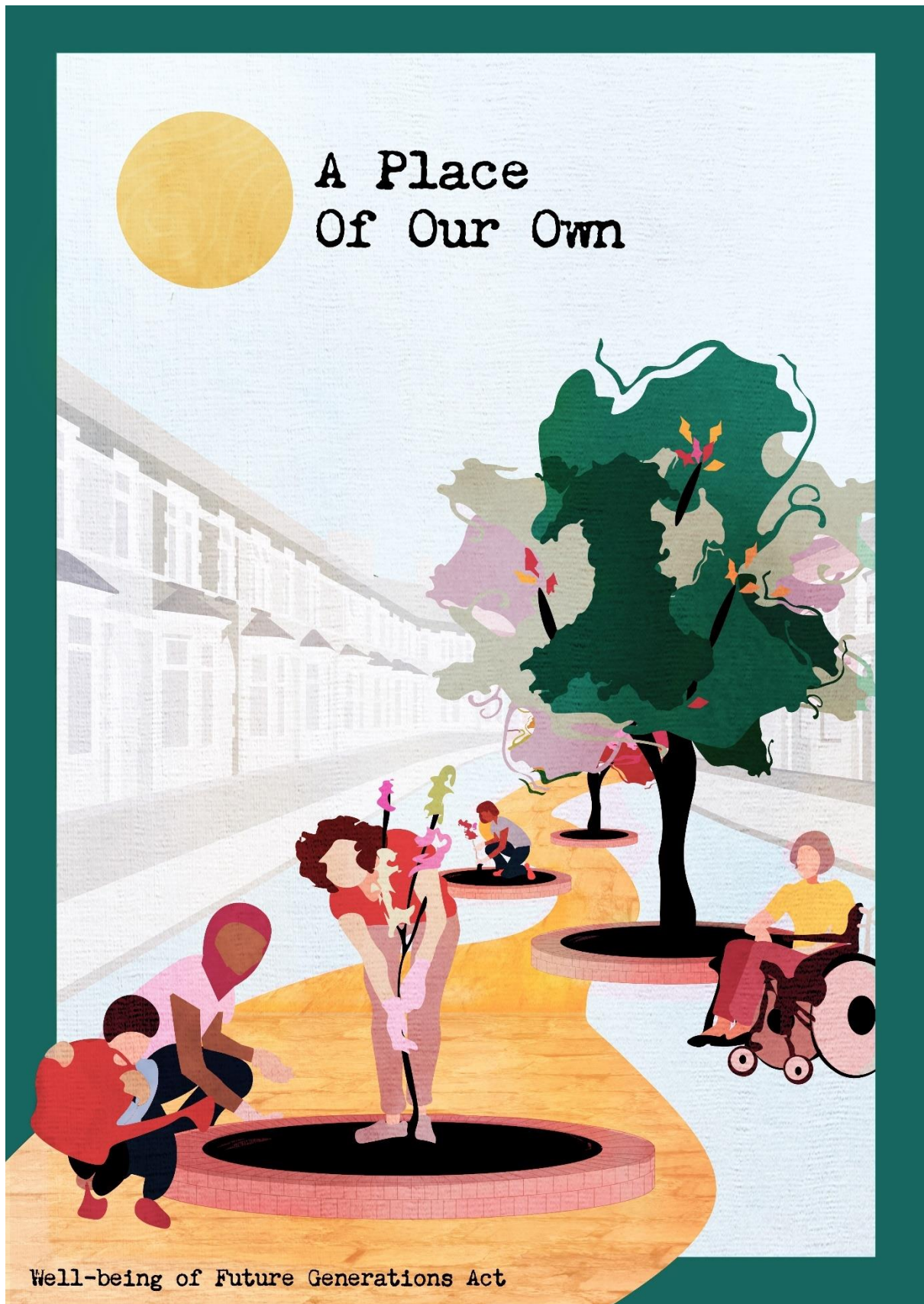
Together, the case studies raise two connected issues – whether generic, flexible adaptable homes can be made to suit all needs, and whether equal (alike) or equitable (fair) housing is preferable.

The live / work design team set out to provide exemplary homes that offer a range of opportunities for home-working, building on four familiar models of live / work accommodation - the shop, the workshop, the study and the shed. While each model's usefulness relies on flexibility and adaptability, the models are not conflated. To do so would diminish their character and their effectiveness. Flexibility and adaptability are promoted, but so are difference and distinctiveness.

Similarly, the homes for people with acute needs demonstrated that while flexibility and adaptability will broaden the range of needs, and people, for whom housing is appropriate, there remain users for whom more bespoke forms of housing is needed. By designing homes that are universally viable, we risk designing overgenerous spaces and layouts which suffer from a loss of distinctiveness, and may considerably reduce the number of homes that are deliverable. In contrast, by providing access for all, designing to good space standards and introducing flexibility and adaptability, we make homes that are suited to more people, and make them better places to live at the same time.

Guiding principle:

Understanding the user is key to better decision-making; people should be at the centre of housing design. (Generic housing that tries to accommodate everyone equally tends not to really suit anyone.) Decent space standards, long term quality and engagement with the user should be prioritised over short-term capital cost.



Poster 4: *a Wales of cohesive communities*

Designed by WSA Year 2 students Bethan Batson, Prity Chatterjee, Barney Johnson and Tim Purves

Essay 4:

Sharing space - is hell other people?



Sartre's famous quote is frequently used to support the misanthropic view that homes should maximise privacy and security at the expense of conviviality or shared space. The philosopher himself offered a clarification: "'Hell is other people' has always been misunderstood. It has been thought that what I meant by that was that our relations with other people are always poisoned, that they are invariably hellish relations. But what I really mean is something totally different. I mean that if relations with someone else are twisted, vitiated, then that other person can only be hell. Why? Because ... when we think about ourselves, when we try to know ourselves ... we use the knowledge of us which other people already have. We judge ourselves with the means other people have and have given us for judging ourselves."

For more than a century, the familial and social ties that bind us to a physical place have been eroded by increased industrialisation and globalisation. Few people now stay within the community they are born to. More recently, digitally-led lifestyle changes that include prolific social media use and online shopping have increased our detachment from the physical world around us. While social media promises 'perpetual contact', for less digitally adept people this inevitably increases the risk of isolation. And the more that communication takes place online, the less communication is likely to take place within our immediate physical community. Combined with the axiom that 'hell is other people', there is a view of our future neighbourhoods where homes are bubbles that we retreat into, and communication takes place in a reductive, spatially abstract way.

While there are tangible benefits to digital communication and connectedness to people who are not physically close, there are also clear reasons for making deeper connections within our immediate community. Overleaf, this essay uses two of the HFFG proposals to explore such benefits.



figure 4.4a:
Housing homeless people
– an approach that
combines the right to
decent housing with the
importance of shared
spaces.

Social housing for families and individuals (general needs)

Housing association Grwp Cynefin identified a local need for one and two bedroom homes for social housing, and two and three bedroom homes for intermediate rent. This information provided the basis for a brief to deliver social housing on the HFFG site.

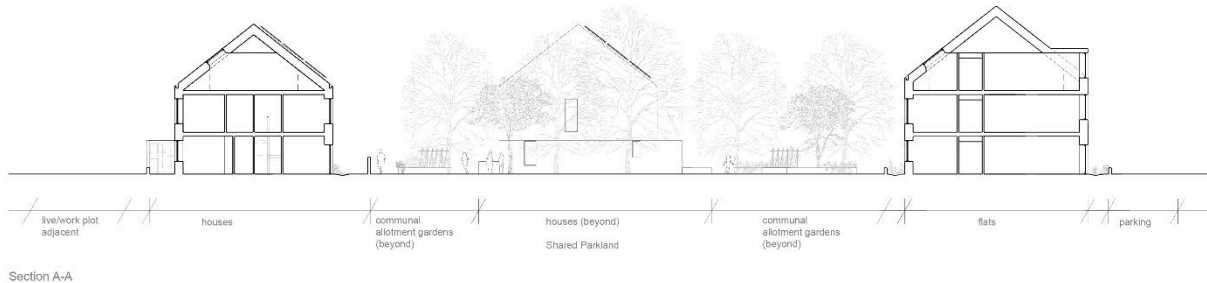
The HFFG proposal by Feilden Clegg Bradley Studios aims to deliver a cohesive neighbourhood by embedding people within a connected community. A woodland setting is made by planting native trees throughout the housing. With a target of 20% canopy coverage, the trees create both a shared park-like space at the centre of the site and a biodiverse wind break along its perimeter. In addition, shared allotment gardens provide a social hub. As a shared social space, they would connect neighbours and host impromptu gatherings, enabling residents to supplement their diet with healthy, seasonal fruit and vegetables. Raised beds increase accessibility to allow more people get involved. These amenities would be opened up to the wider neighbourhood, establishing intergenerational links and knitting the new community into the existing one.

To deliver this vision, vehicle movement is restricted to the edges of the site, creating a safe environment for people. Dwellings don't have traditional fronts and backs, but are arranged in response to orientation and to maximise views outwards. Their alignment preserves views of Snowdonia to the east for the wider community, embedding housing in the natural beauty of the area rather than obliterating it. This approach, which maximises permeability of the neighbourhood as a whole, is counter to typical suburban layouts - which control character by closing themselves off from the wider context.



figure 4.4b: Shared woodland habitat embedded within a permeable housing layout

Inside, dwelling layouts balance passive solar gains, daylight and overheating, with kitchens to the north and modest patios extending living spaces to the south. In place of a large private garden and a close boarded wooden fence, each home is connected to its neighbours and to the communal woodland via a low wall and a rain garden.



Section A-A
figure 4.4c: Site section – diminished boundaries give rise to a blurring of public and private

Maintenance of such a rich array of external spaces poses a real challenge for developers. Stewardship could be nurtured through community groups led by the Housing Association, alongside the many benefits of gardening and time spent outdoors. Ecologically rich corridors connecting on-site habitats with the wider landscape would significantly increase their value, as well as connecting each dwelling to the next, increasing the sense of belonging. This blurring, or expanding, of public / private thresholds could play a key role in engendering a stronger sense of ownership and pride, if the extensive woodland setting is to be properly maintained. However, such an approach is counter to established development principles and standards (e.g. Secured by Design accreditation) which focus on clearly established ownership boundaries, defensible spaces and maximising visible security at all times.



figure 4.4d: site plan and landscape key

Collaborative living for homeless people (specialist needs)

For many years, the systemic response to homelessness has been to place people on a ladder. Progression up the ladder towards permanent accommodation and stability is arduous, and each rung provides different opportunities for people to 'fall off', and become lost in a cycle of support and failure. The latest homelessness statistics for Wales show the highest number of households in temporary accommodation since 2015. Most investment in homelessness currently goes into emergency measures, while evidence shows that this investment does little to prevent the same entrenched problems occurring in the future (Homelessness Action Group, 2020 section 6.1).

The *Housing First* model proposes an entirely different approach. Pioneered in Finland (see Essay 3) and adopted with success internationally, it is closely aligned with a key assertion of the 2020 Future Generations Report, that “wellbeing must require somewhere to live” (p.523), and the stipulation of the Universal Declaration of Human Rights (1948) that ‘adequate’ housing “is universally viewed as one of the most basic human needs.” (UN Fact Sheet No.21, *The Human Right to Adequate Housing*, p.1)

According to the Housing First model, people who present as homeless should be given immediate access to housing that meets their needs, located within a wider community. From their new home, they should be provided with the support they need to sustain their tenancy, re-integrate into society and ultimately thrive.

The HFFG proposal for homeless people begins by looking at the connection between people and neighbourhood, because there is clear evidence that the wrong location can inhibit or undermine the recovery that the Housing First approach seeks to promote. In contrast, the right kind of neighbourhood can be a determinant of health, well-being and social integration for people who are homeless.



figure 4.4e: The *Housing First* proposal located in its wider context

A mix of accommodation is provided, to ensure that the housing meets a range of different needs. This includes short- and intermediate-stay studios of various sizes, along with flats that would also meet intergenerational requirements. The resulting diversity should appeal to a broader range of households, reducing the likelihood of identifying and stigmatising the development as a ghetto for homeless people.



figure 4.4f: Housing First accommodation located directly off the public 'high street'.

The result is a dense, mixed, low rise development located immediately behind commercial and residential spaces that collectively define the 'high street', which provides a modest selection of amenities on the project's 'doorstep'. Apartment layouts are configured to maximise connections with the world outside, along with shared spaces between inside and outside, to diminish isolation and claustrophobia.



figure 4.4g: Convivial spaces for informal gathering located outside apartments.

The accommodation is wrapped around therapeutic gardens and growing courtyards. These gathering spaces provide meaningful activities for residents to participate in, outside of their individual apartments. The process of locating housing for homeless people within an existing neighbourhood rather than creating a self-contained, closed 'community' is key to the success of the Housing First approach.

To return to the oft-misinterpreted statement that 'hell is other people', it is clear from the general-needs and specialist case studies that the success of both proposals relies on establishing meaningful connections with other people, by developing links to the wider community. This approach is entirely at odds with most contemporary housing developments for a number of reasons:

- From a developer's perspective, sites with closed boundaries and limited permeability are more straightforward to develop, and enable them to maximise the capacity of the site.
- Sites that are not overly influenced by adjoining neighbourhoods (for example by overlooking) are often considered to be lower risk, in terms of the financial value of the homes that are developed.
- Estate roads tend to be designed to suit the capacity of the estate they are serving, and approaches that increase permeability may challenge assumptions around the capacity of existing infrastructure.
- It is often assumed that prospective homeowners want to maximise the private space attached to a new home, at the expense of any public or shared space. Maintenance and supervision of shared spaces lead to greater complexity (for example householder associations and service charges) and tend to be avoided.

Recent (and not so recent) changes to our lifestyles and ways of living have cumulatively disconnected us from our wider communities. To respond to these changes, housing must do more to reinstate connections between people and the neighbourhoods they live in. However, this requires a more sophisticated approach to development, and less generic / more contextually responsive design. Clearly this ambition creates a tension between 'good' housing and approaches that drive down capital costs through standardisation, repetition and mass production. However, connectedness must be valued by both planners and developers, and changes made to current modes of practice, if 'community' is to be valued, now and in the future.

Guiding principle:

Neighbourhoods should be developed with clear connections to their context and to existing communities. Improved permeability, shared amenities and spaces for play and intergenerational activity should increase the sense of ownership, with particular focus on younger generations.



Poster 5: *a prosperous Wales*

Designed by WSA Year 2 students Connor Bryan, Jannat Laskar and Michael Ly

Essay 5:

Signs of growth – building for recovery



“A house constitutes a body of images that give mankind proofs or illusions of stability.”
Gaston Bachelard (cited in Stilgoe, 1964, p.53.)

The bricks and mortar of our houses, towns and cities may give the impression of stability, but that stability is crumbling. In the wake of the global Covid19 epidemic, the UK economy is in crisis. “By the end of the 2020/21 financial year, the government will most likely owe in debt more than the value of everything produced in the economy in one year.” (Gathergood, 2020) The immediate loss of resilience caused by Covid19 will be conflated with the longer term, as yet unknown, implications of Brexit. As a consequence, the Bank of England has predicted the UK’s worst economic crash this year in more than 300 years.

Meanwhile, Wales’ economy is at a tipping point. The existing economy is built on steel, sheep and dairy farming, but the role of these industries in a low carbon future is likely to be marginal, or even detrimental to the nation’s ability to meet international targets. Irish and Scottish governments have both committed to forestry as part of their medium-term low carbon economic future, and significant increases in funding for afforestation have already made an impact – over the last twenty years, Scotland has added woodland equal to half the total existing woodland in Wales.

The Welsh landscape, soil and climate are suited to forestry. The sloping topography of Wales render much of the country unsuitable for most types of farming. Large tracts of land are currently used for sheep farming, which was challenging to sustain even before the underpinning EU *farm support* scheme was withdrawn.

Afforestation could be part of a meaningful response to the climate emergency. Forestry could provide a new resource with which to build and retrofit low carbon homes throughout Wales. Increases in natural habitat would mitigate some of the recent devastation of national biodiversity, and a significant shift towards a timber economy would reduce global warming via increased carbon sequestration (locking carbon dioxide into timber used for construction and other productive industries). The consequent reduction in livestock (sheep farming in particular) would also reduce methane production which adds considerably to global warming. However, the financial benefits are not short term (being dependant on a 20+ year growing cycle), and such a fundamental change requires strong political will and widespread support.

The *Serious about Green?* report by the Foundational Economy Research team analyses the economic and social parameters of a timber-based Welsh economy. The report asserts that a wood economy “should be a key new resource reliance system for the twenty first century foundational economy... to safeguard the well-being of future generations by managing resource inputs and outputs so as to reduce the planetary burden.” (Calafati et. al. 2020, p.3)

Support for a wood economy will come more readily when greater value is seen in the commodity produced by Welsh forestry. Traditionally, Welsh timber is assumed to be poor quality, with limited applications. “Currently, two thirds of sawn Welsh timber goes into low value products such as fencing and packaging” (Calafati et. al. 2020) Powys Local Authority have attempted to challenge these assumptions with their Wood Encouragement Policy, which stipulates that local timber should be prioritised over imported timber. The first social housing to be built by the Local Authority for thirty years is currently being constructed from Welsh structural timber with wood fibre insulation and timber windows.

The *Zero Carbon Homes* report by Wood Knowledge Wales (WKW, 2019) looks more explicitly at the benefits of a wood economy, focussing on the construction industry. The report notes that the UK is the world’s third largest importer of timber, requiring a productive woodland area each year roughly the size of Italy. It provides a strategic action plan to incorporate Welsh timber in house building and help deliver the WFGA aspirations. Proposed actions aim to increase supply chain integration, encourage a focus on producing higher value products from Welsh wood, and address the chronic lack of tree planting in Wales. The diagram below maps the resulting benefits.

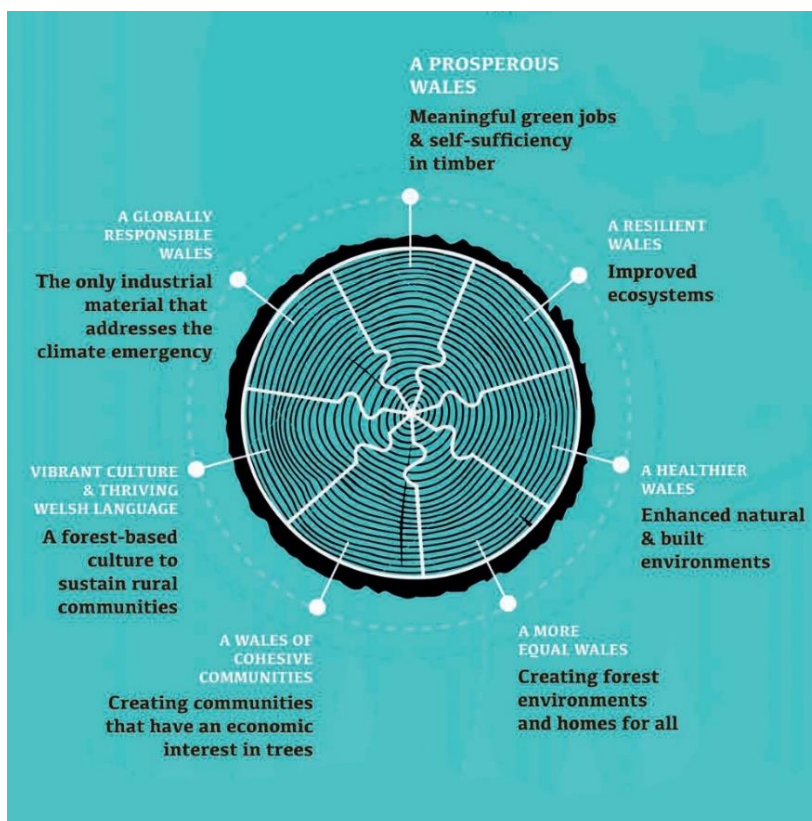


Figure 4.5a:
The report by Wood Knowledge Wales (2019) maps the benefits of a wood economy holistically against WFGA goals. It identifies timber (along with related organic products such as straw bale) as the only construction material to meaningfully sequester carbon, creating the opportunity for buildings to begin their lifespan as carbon negative resources, rather than coming at a carbon cost.

The report cites the ongoing housing crisis and apparent limits to capacity of traditional on-site building methods as a reason to properly explore the potential of local timber use to be aligned with offsite fabrication and Modern Methods of Construction (MMC), to increase the scale and pace of housing delivery, and ensure better performance via more manufactured approaches and more stringent quality control.

Custom-built starter homes

Collectively, the design proposals explore a range of different approaches to construction that could be used to build homes that meet the decarbonisation agenda. Some use established or emerging timber systems to reduce the carbon footprint of construction and increase local resource use, or develop particular skills within a community. Other proposals utilise MMC to achieve greater efficiencies in construction and improve quality through off-site fabrication, or to deliver housing that is more flexible in use, or can be uprooted and redeployed to meet changes in demand.

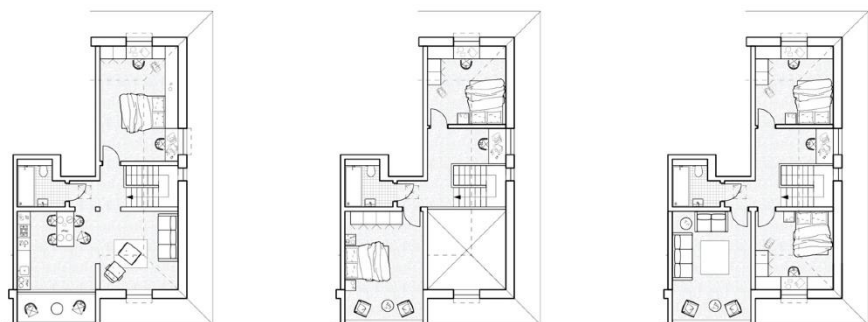
“Modern Methods of Construction are about better products and processes. They aim to improve business efficiency, quality, customer satisfaction, environmental performance, sustainability and the predictability of delivery timescales. Modern Methods of Construction are, therefore, more broadly based than a particular focus on product. They engage people to seek improvement, through better processes, in the delivery and performance of construction.”
(Barker Report, 2006)

Rural Office for Architecture (ROA)’s proposal for custom-built starter homes takes the discussion around alternative methods of construction and assembly further, challenging the procurement and delivery methods typically adopted by housing providers. The practice developed an adaptable, sustainable building system that can be adopted across a wide range of scenarios, consisting of a Social Framework and a Technical Toolkit. Together, these two elements enable different stakeholders to work collaboratively within set design parameters and successfully apply established principles to an individual context.

Figure 4.5b: a series of iterations (ground floor above, first floor below) demonstrate the adaptability of the plan, in particular with regard to the provision of lifetime homes.



Lifetime tenure is a primary objective when designing for adaptability, allowing occupants to expand or contract their home as needs change over time.



A basic framework of spaces is proposed (the Social Framework). Some are 'hard' with fixed constraints and others are 'soft', allowing for adaptability, expansion and contraction, providing the opportunity for lifelong tenure. This allows for numerous forms of tenancy, occupation and adaptation to coexist. Community models will vary depending on the skills, energy and competence of occupants. The open, adaptive framework extends to outdoor spaces. These are shared by multiple households, accessed via a pedestrianised street that expands to provide larger spaces suitable for play, socialising and gathering, and supported by common rooms for wider community use. The principle is to create a shared territory, or common, which breaks down traditional privatised territories for a more fluid land use and occupation, specific to the people living there and the configuration of their homes.

The Technical Toolkit describes a building system that can be understood and adapted by both developer and inhabitant. It provides a range of custom-build options, configurations, and potential adaptations. It is assumed that a housing association or developer would build the inhabited roof, structure, services and core. This allows for efficiencies and economies of scale in the delivery of key components of the technical toolkit. The extent to which the developer is involved in the remaining construction work depends on the occupier's finances and needs:

- A self-build approach is applicable where costs need to be kept low or the occupant's engagement and skills levels are high. The occupier would build external and internal walls, and would fully fit out the home.
- A self-finish approach is applicable where cost needs to be constrained and the occupant's engagement and skills are moderate. The occupier would build internal walls, and may install sanitaryware, fixtures and fittings.
- A custom-build approach is applicable where the occupant's engagement is modest. The occupier would furnish and decorate the home.
- An occupier-ready approach is applicable where cost is not a significant factor or engagement and skills are low. The developer would complete the home.

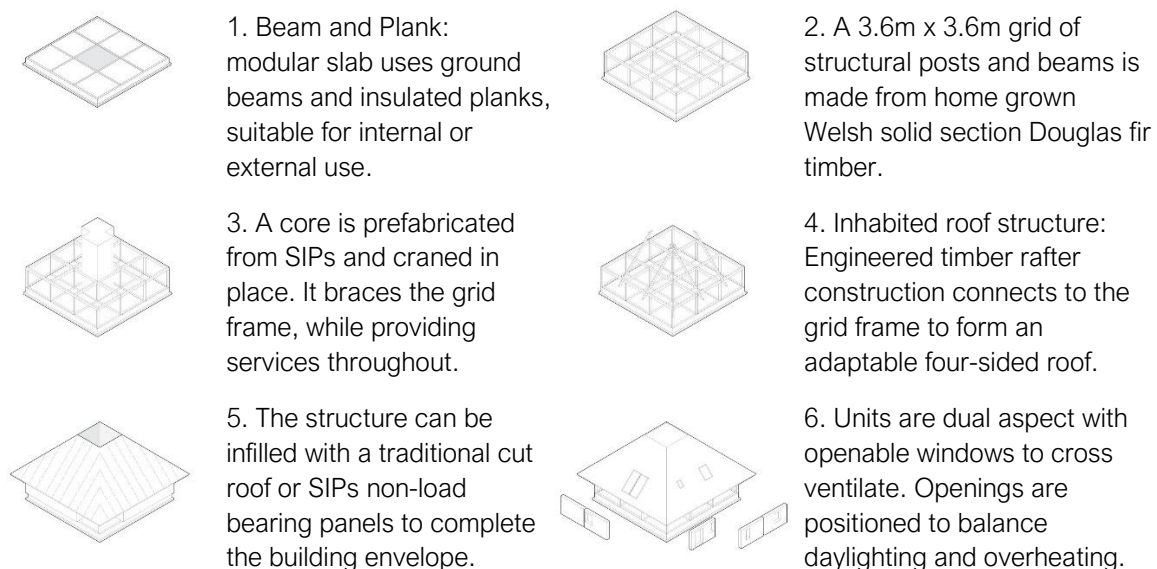


Figure 4.5c: the construction sequence

The *custom build starter homes*, like all of the HFFG case studies, adopts performance standards outlined by the London Energy Transformation Initiative (LETI) for achieving net zero carbon. The LETI standard includes a ‘fabric first’ approach to the building envelope which maximises environmental performance, while reducing both energy costs and carbon emissions. It also stipulates low carbon heating and ventilation systems. On-site renewables complete the site-wide zero carbon strategy.

For the *custom build starter homes*, an MVHR (Mechanical Ventilation with Heat Recovery) unit and solar thermal panels are incorporated within each dwelling core, providing efficient systems, low carbon heat and renewable energy for each home. However, embodied carbon is as important a consideration as carbon in-use, if true net zero carbon development is to be achieved. Large amounts of timber are used in fabrication of the dwelling envelope (see previous page), sequestering carbon in the construction and providing a carbon-negative starting point for the dwelling and user. The modular building structure reduces the need for extensive maintenance and promotes a sustainable culture of adaptation, re-use, and recycling of elements, further reducing carbon production across the lifespan of the building. Finally, the proposed materials and components can be disassembled at the end of the building’s life, in accordance with circular economy principles.



Figure 4.5d:
an interior section looking towards the kitchen and service core. A double height space connects living spaces with central circulation.

All six case studies were modelled using SAP to explore performance in terms of energy and carbon. The results compare compliance with current (2018) Building Regulations with compliance with the LETI standard (see section 5.2: six case studies – energy and carbon). Compliance with current Building Regulations limits decarbonisation to between 66% and 78% (versus 1990 levels). This is principally because heating systems are assumed to run on mains gas, a carbon-heavy energy source.

When the fabric of homes is upgraded to the LETI specification, heating systems can be transferred to low carbon energy with limited impact for occupants (houses tend to perform slightly better, flats slightly worse). Compliance with the more stringent LETI standard then delivers between 90% and 94% decarbonisation. Combined with modest further improvement in energy supply, this specification would consistently deliver the reduction of greenhouse gas emissions needed to meet international decarbonisation targets.

A site-wide assessment of renewables potential indicated that roof-mounted photovoltaic panels (PV) would generate around 378,878kWh of electrical energy across the site per year. Renewables are currently needed to meet decarbonisation targets. They will not be essential to meet decarbonisation targets in the future if energy continues to become cleaner. However, installing renewables (typically roof mounted PV) also reduces heating bills – by an average of £500 per year. This improvement could be critical to decarbonisation being affordable, or desirable, for the occupant.

When the case studies are modelled to current (2018) Building Regulations Part L, on site renewables meet around a third of all predicted energy demand. When the case studies are modelled to the LETI specification, on site renewables meet two thirds of all energy demand across the site, bringing the scheme considerably closer to net zero without resorting to off-site renewables or carbon offsetting.

“We are forced to choose between three courses of action:

The first is to build only the small amount we’re likely to be able to afford. This is to acknowledge defeat.

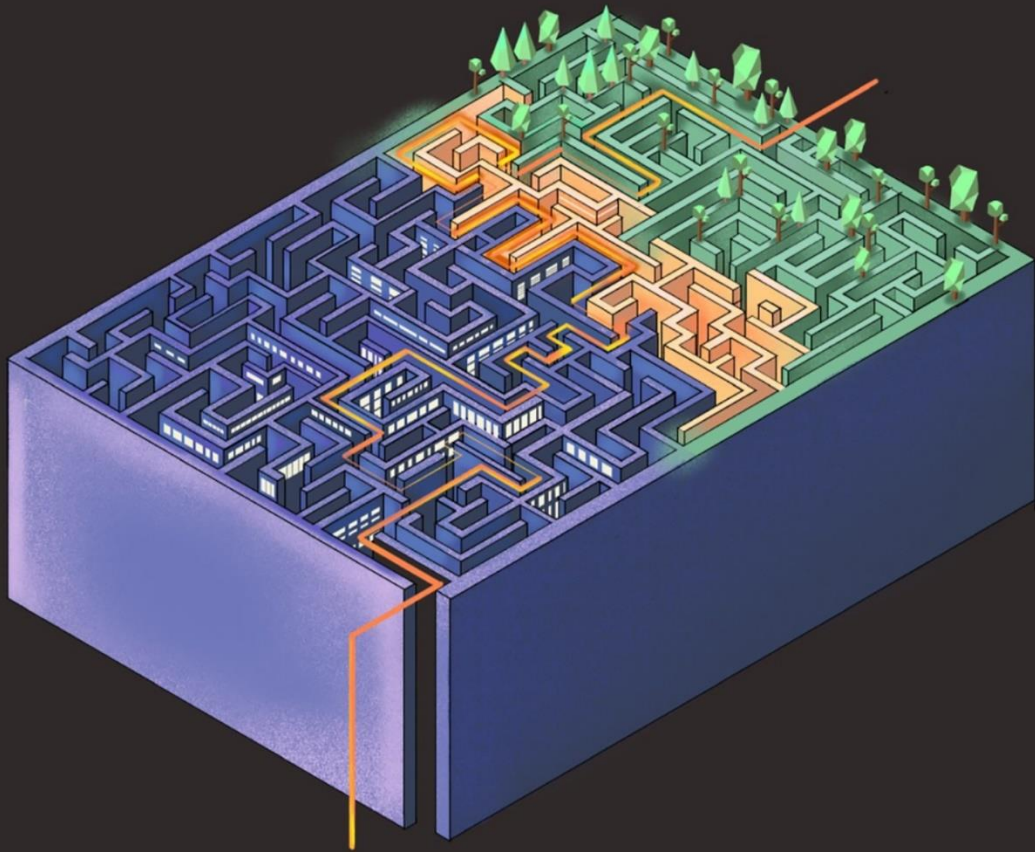
The second is to accept a drastic reduction in space and quality while maintaining the same total. This again is defeat, and why should we accept defeat in this, when we have accomplished so much in other fields – radar for instance, nuclear fission, or jet propulsion?

The third course is to approach the whole problem of building afresh, with the objective of devising a fundamentally simpler technique, a technique which will give us greater beauty, comfort and value at a lower cost.”

RMJM co-founder Stirrat Johnson-Marshall, faced with similarly austere circumstances following the Second World War (speaking on the BBC’s Third Programme in 1950)

Guiding principle:

Use of locally available, low carbon and carbon sequestering materials should be maximised. Techniques employing local materials, systems or people should be prioritised. Opportunities for training and reskilling should be exploited. Together, these changes will build valuable, productive, locally based, low carbon circular economies.



CONNECTING TO THE OUTDOORS
For a healthier Wales.



Poster 6: *a healthier Wales*

Designed by WSA Year 2 students Agata Kurzynska, Tabitha Muthoga, Sandra Nzioki + Jayne Spearman

Essay 6:

The benefits of building better



“It is estimated that the cost to society (including medical costs, lost education and employment opportunities) of leaving England’s poor housing unimproved is £18.6 billion. The annual NHS costs for the same homes are £1.4 billion, equating to 8% of the total cost to society.” BRE 2016

The WFGA goal: *A Healthier Wales* requires that public bodies make decisions that help people achieve the best quality of life they can. This includes helping them to maintain good physical and mental health, through the provision of environments that support healthy lifestyles.

This legislative directive to build healthier homes comes in the context of a diminished and compromised National Health Service. “The NHS is in danger of imploding. The squeeze on funding and the increased demands of an ageing population living with multiple long-term conditions are putting severe pressure on the NHS. Unless action is taken, this can only get worse.” (Chevin, 2014 p.6) The requirement has very different implications for different sectors of the population:

For relatively affluent middle-class households who can afford to heat, cool and ventilate their homes properly, the key health-related benefits of better housing are around choice and convenience. For regular physical exercise to be convenient and safe, appropriate local amenities are needed – indoor and outdoor spaces for exercise and play (both public and private), along with connections to pleasant or stimulating safe spaces and routes for running, walking and cycling. Better mental health is promoted with a similar provision – homes that offer views, sunlight and outdoor spaces, alongside formal and informal public places to meet others and access therapeutic services.

In the future, we may see the cost of energy in the home rise considerably as energy providers come under increasing pressure to reduce the carbon emissions arising from energy supply. For most homes in the UK, decarbonisation is likely to mean a transition from mains gas (currently the main source of heat in 70% of homes) to heat from electric systems, and electric heat currently costs three times as much as heat from natural gas. As climate change continues to impact on the environment, overheating may also become an issue for many homes, particularly more recently built timber frame homes with limited thermal mass. Cooling will add further to already expanding energy bills, through additional electricity consumption. The collective impact of these changes is that more vulnerable households, and households with smaller incomes, will probably find it increasingly difficult to afford to heat and ventilate their homes properly.

For households that cannot afford to maintain comfortable conditions at home, fuel poverty can have a profound and wide-ranging impact on wellbeing and quality of life.

“While cold homes are an essential component for understanding the relationships between fuel poverty and health, they are only one aspect of a complex and multifaceted phenomenon” (Poortinga, 2019). Housing that drives down energy bills while meeting decarbonisation targets will deliver meaningful and sustained health benefits for these households in the future, so long as the homes are designed in a way that meets the users’ needs, and any systems installed are easy to use.

Many of the benefits of building better homes described in this report are difficult to define explicitly, let alone measure. However, the health-related costs of poor quality housing have been quantified (see *The full cost of poor housing*, BRE 2016). Cold homes have been shown to be particularly detrimental to cardio-respiratory health and immunity levels. Energy efficient homes that provide affordable warmth for households at risk of slipping into fuel poverty will undoubtedly reduce the pressure exerted on the health service, with many and various longer term benefits.

Equally, the benefit of homes with good air quality and low risk of condensation or damp can be quantified, because they can be offset against costs borne by the Health Service in the treatment of specific, recurring issues - including both viral respiratory diseases such as influenza (flu) and chronic (long term) conditions such as asthma. In urban environments in particular, heavily polluted outside air quality can be as much of a problem as poorly performing environments indoors (exposure to high level of NO₂ from exhaust fumes can also lead to a range of respiratory problems). Homes that provide better environments through reduced car use, use of healthy (breathing) materials and construction, robust specifications and detailing that minimise the risk of damp or condensation problems, and techniques known to improve indoor air quality (such as MVHR systems) will inevitably further reduce the burden on the NHS.

Harder to quantify (in terms of cost, at least), but no less important, are the benefits that relate to more complex conditions influenced by a wider range of factors. Mental health is a good example. Anxiety, depression, isolation and low self-esteem are increasingly commonly reported problems among the general population. A survey conducted in 2014 by Mind estimated that 1 in 4 people in the UK experience mental health problems each year. While poor mental health may not be caused by the environment at home, a person’s home inevitably contributes to their mental health in a positive or negative way, and simple changes to the design of the home can provide mental health benefits. These changes include making the home more adaptable (so that it suits and supports people with more varied lifestyles including different live / work arrangements), improving the relationship between inside and outside (so that inhabitants derive more benefit including views and natural light) and changes to the organisation of - and boundaries - between homes that improve the connectedness between dwellings (increasing sense of community and belonging, and reducing isolation).

“Not only are we living longer, so that our ‘oldest old’ are twice as many as 15 years ago, but the average Briton is now comparatively middle-aged. Although the young population (aged 5–15) is shrinking, more than half of babies born now in the UK will live to be a hundred.” (HAPPI 2009)

In 2009, the influential *Housing Our Aging Population* (HAPPI) report explored the degree to which housing models meet the needs of an expanding 'third generation'. This generation includes people who are more likely to have mobility issues or need support in the home, and for whom there is an increasing prevalence of conditions such as dementia. For many older people there is a clear tension between needing help and wanting independence, and older people can be particularly vulnerable to isolation and the cumulative impact of long periods of time indoors, if appropriate housing is not provided. Because there is such a paucity of good housing that is desirable and meets the more complex needs of older people, many choose to stay in over-sized 'family' homes, often compounding health issues.

The HAPPI report highlighted that a lack of regulation in the private housing sector means there are few minimum space standards, and most types of housing are considerably smaller than their European counterparts. Some of the regulations we do have (such as Building Regulations Part B) promote separation of spaces, further diminishing flexibility. Gardens and outdoor areas may not provide useful additional space or relief from being indoors for people with mobility issues - approximately a third of older people cross the threshold of their front doors only twice a week (Sinclair et al., 2007).

Accessible homes for older people (specialist needs)

The All-Party Parliamentary Group on Housing and Care for Older People reported in their 'The Affordability of Retirement Housing' report that "homes designed for those retiring or in their 'extended middle age' achieve cost savings and have significant benefits in health and well-being, while also releasing capital to improve the incomes (and quality of life) of older people. However, the number of homes built specifically for older people has decreased from 30,000 p.a. in the 1980s to around 8,000 p.a. today."

The recent (2019) RIBA 'Home for the Ages' report quantified the cost of inappropriate housing for older people, predicting that it is likely to rise to £1 billion per year by 2041. Pentan's proposed *homes for older people* were designed with two key aims:

- to encourage / enable older homeowners (many of whom own large, valuable family homes) to 'rightsize' to more age-appropriate accommodation, helping to re-balancing the housing market, and
- to provide homes that can be adapted to the changing needs and aspirations experienced in later life without a loss of quality / decency, reducing the burden on health and social care systems through improved mental and physical well-being and a stronger, more supportive community.

The HAPPI report identified ten design principles to reflect the needs of older people. The HFFG proposal by Pentan architects took these principles as a starting point, to design 'a home for life' - housing that is truly suited to older people, including people with mobility issues, and that explores the beneficial effects of natural light and connections with the outside world. The ten HAPPI principles are:

- Space and flexibility
- Daylight in the home and in shared spaces
- Balconies and outdoor space
- Adaptability and 'care ready' design
- Positive use of circulation space
- Shared facilities and 'hubs'
- Plants, trees, and the natural environment
- Energy efficiency and sustainable design
- Storage for belongings and bicycles
- External shared surfaces and 'home zones'

The proposed older persons' housing is centred around a productive community landscape. In addition to growing food, the garden provides a place for the community to gather and share resources and conversations. Each home is also wrapped around a more private courtyard garden; a psychologically important 'patch of one's own' for the downsizing resident. Boundaries are designed to encourage interaction with neighbours, and provide a place to watch the world go by whilst feeling part of something bigger.



Figure 4.6a: view from the street of a productive landscape, with private courtyards behind.

The proposal seeks delight in the everyday by elevating mundane moments to something more special, and providing places for possessions and memories to be collected - a key to maintaining mental wellbeing, particularly when cognitive function begins to decline. The home also provides an 'other' space, flexible enough that the

resident can determine its use. It might be a spare bedroom for visiting family, or for a carer when needed. It might be a winter garden to grow seedlings or a sunspace for sitting in, a hobby room or an office to work in, or communicate with the world outside. It builds flexibility into the dwelling and allows residents to stay in their homes for longer.

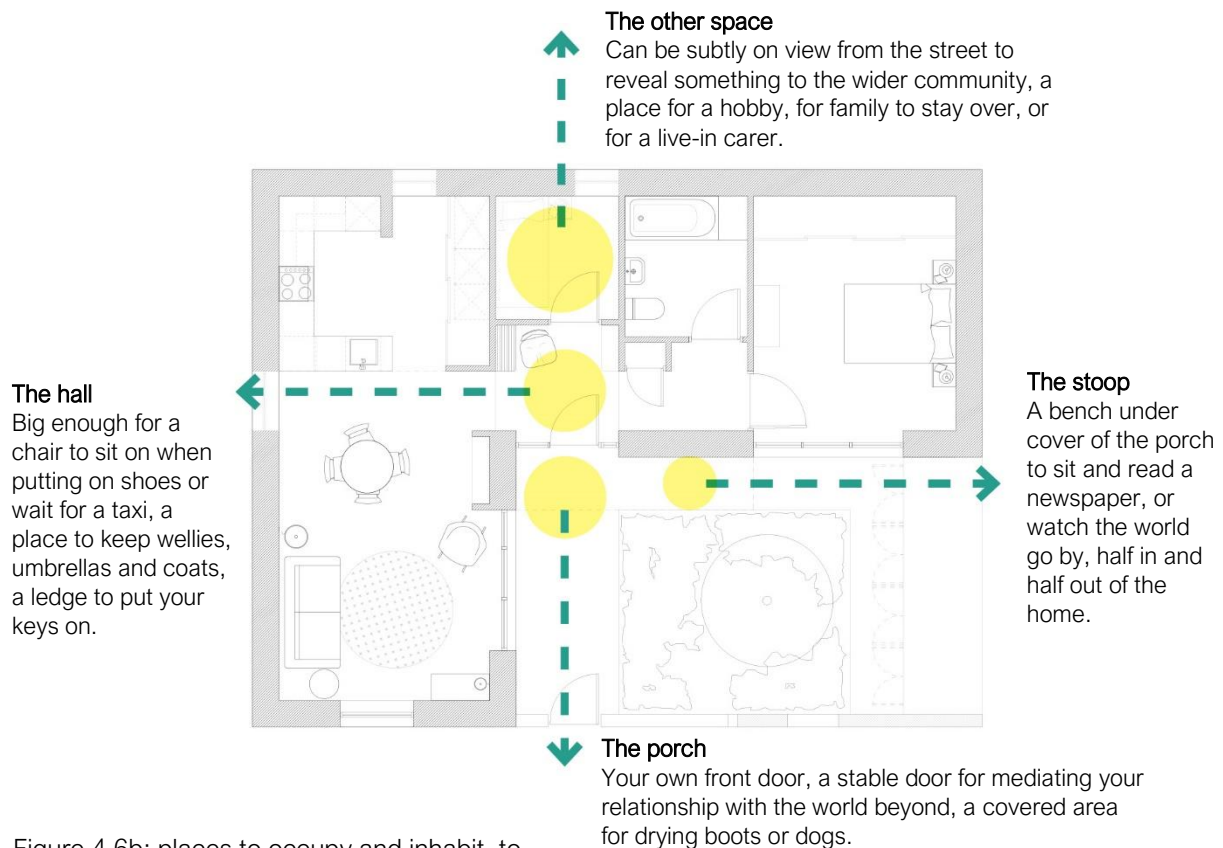


Figure 4.6b: places to occupy and inhabit, to reveal a little of yourself, or gently invite the community in.

To help build a stronger sense of community, the traditional back garden has been replaced with a shared landscape, and communal growing spaces are provided in lieu of the sterile, nondescript public open areas typically provided in housing developments. Purposeful shared spaces should instil a greater sense of ownership and pride, reducing the burden of managing less well defined spaces.

With reduced land take for each plot (through a reduction in private outdoor space), these changes should be cost neutral. Other components of the design could easily be lost to ‘value engineering’, but with the consequent loss of related mental and physical well-being benefits. If the true cost of isolation and poor health were compared with the cost of these ‘extras’, established notions of ‘good value’ might be different.

The HAPPI report concluded that “the time has come for a new national effort to build the homes and create the environments that will meet our needs as we all grow older.” (HAPPI 2009) However some of the more significant changes needed are not design decisions, but more fundamental changes to the way that housing is developed, the type or size of housing that is delivered, and its location:

“It is important to understand the real needs of older people, and the housing models that can be put in place to address these. We need to watch out for focusing too narrowly on design, because although design is important there’s only so much it can do. Planning policies should be looked at, and also existing stock. These are things that have a major impact.”

Yinka Bolaji, Head of Portfolio and Business Planning, Anchor Trust (HAPPI, 2009)



Figure 4.6c: Neighbourliness, if you like. A fancy wall and a garden gate, a bit of footpath, a stable door...

Technology certainly has a part to play in building better homes in the future, and in bridging the gap between housing and healthcare (for example, recent improvements in smart home technology). Emerging technologies will be particularly useful in providing homes that can be adapted to meet more complex needs. However, it may prove to be the case that the wider health-related benefits of building better homes have less to do with smart infrastructure and assistive technology, and more to do with making places where people really want to live, and that foster a strong sense of community (see table 4.6 overleaf, summarising issues, actions and benefits). For now, at least, we should focus on building better homes that incorporate all of these things.

“New ways of working are needed and there is no better time for housing professionals to engage with health and care decision makers. Housing professionals can make it easy for local decision makers by identifying the housing and housing services that can deliver the health and care outcomes required.”

Jon Rouse, director general, Department of Health

Issue	Action	Benefit
Rising cost of comfort in the home, increasing risk of fuel poverty	Energy efficiency homes providing affordable warmth	Reduced need for NHS, notably treatment of respiratory diseases
Risk of overheating, particularly in recently built lightweight homes	Homes with thermal mass and cooling measures designed in	Reduced likelihood of uncomfortable homes or future cooling retrofit
Unhealthy internal environments resulting from fabric failure	Homes built with healthy materials, designing out condensation and damp	Reduced need for NHS, notably treatment of respiratory diseases
mental health issues incl. anxiety, depression, isolation, self esteem	Homes built to appropriate space standards, flexibility for varied ways of working	Better mental health and quality of life generally
mental health issues incl. anxiety, depression, isolation, self esteem	Homes connected to positive outside spaces and the wider community	Better mental health and quality of life generally, stronger community
Poor access to healthcare and associated support services	Homes and communities that enable local advice, diagnosis and treatment	Reduced pressure on NHS centralised systems and hospital beds

Table 4.6: Shortcomings in many homes, along with potential actions and resulting health benefits

Guiding principle:

Homes must be comfortable to occupy and affordable to heat. They should be built of healthy materials. Views, natural light, spatial arrangements and boundary treatments should connect occupants to the outdoors and each other. Neighbourhoods should support activities that promote physical and mental health and wellbeing.



Poster 7: a globally responsible Wales

Designed by WSA Year 5 students Jasmit Bour, Madeline Howell, Simran Mahajan and Adam Wade

Essay 7:

The challenge of behaving better



The eyes of all future generations are upon you. And if you choose to fail us, I say - we will never forgive you.

Greta Thunberg, UN Climate Summit, New York, 23 September 2019

Prior to the First World War, Britain's housing was constructed only by private builders. All domestic construction ceased during the war, and when the nation finally emerged from conflict in 1918, it faced a housing crisis compounded by shortages of both materials and labour. Liberal Prime Minister David Lloyd George addressed the nation just days after the War was declared over, to speak about the challenge ahead:

"The stateliest homes on earth today are often the most desolate at this hour. On the other hand, the country realises in a way that it never did before, how much it owes to the citizens who dwell in the humblest of homes... There is, as has never been witnessed before, a new comradeship of classes. I am glad of it, and I am glad that we are approaching the new problem in the spirit of comradeship. Let us keep this as long as we can. Let us finish the task together. Our work is not over yet – the work of the nation, the work of the people, the work of those who sacrificed. Let us work together first. This the appeal that I am making today. What is our task? To make Britain a fit country for heroes to live in..."

The problem has got to be undertaken in a way that has never been undertaken before, as a great national charge and duty. It is too much to leave it to the municipality. Some of them are crippled by the restricted income which is placed at their disposal. Some are good and some not so good, just like the rest of us – therefore the housing of the people must be a national concern, and must be undertaken as such."

The tone of his speech is steeped in the nationalist language of wartime politics, but the words of the first and only Welsh Prime Minister remain relevant today. They are relevant because they speak of an urgent need for change, because they speak of the limits to governance and regulation, and because they speak of a national concern – and the associated importance of collective participation and personal sacrifice.

WFGA describes a *globally responsible Wales* as "a nation which, when doing anything to improve the economic, social, environmental and cultural well-being of Wales, takes account of whether doing such a thing may make a positive contribution to global well-being." There has been much recent discussion of standards that might be used to regulate future environmental performance. Many voices have made the case that it is not sufficient to do 'less bad', and that new development in particular has a role to play in redressing the balance of past mistakes by doing 'as much good as possible'.

Energy-based analysis of the HFFG project revealed a significant difference between adopting current Building Regulations ('business as usual') and the more stringent performance specification outlined in LETI (see essay 5 and resource section 5.2). If the development is built to Part L of the current (2018) Building Regulations, there is an energy deficit across the project of some 500,000kWh/year (around £90,000 of fuel bills each year). In contrast, building the development to the standard outlined in the LETI report results overall in a surplus of energy being exported to the national grid.

Clearly, it is possible to build homes today that have a net positive impact on the wider environment. (The *Living Building Challenge*, an international certification system requiring a net positive impact from built environment projects is now fifteen years old. <https://living-future.org/lbc/>) However, it would be a mistake to assume that by improving or reconstructing the built environment, we can somehow 'fix' societal impact on the environment. Rebuilding and retrofitting our housing stock will only be transformative in conjunction with wider behaviour change. The need to *behave better* pervades all aspects of contemporary life, from the way we live, work and travel to the food we eat and the way we process waste.

There are two approaches for delivery of major change: top-down regulation via policy or enforceable standards, and grass roots shifts in societal, cultural or ethical values. There is evidence of major change being delivered through both approaches. The UK smoking ban in 2007 and more recently the Covid-related lockdown are both examples of top-down regulation that dramatically impacted on the behaviour of society at large, and that most people have coped with – perhaps more effectively than was predicted. Meanwhile, the relatively recent focus on the climate emergency, and the prevalence of vegetarian and more recently vegan diets provide examples of change coming from within society, driven by increased awareness of the underlying implications and the need for more ethical individual decision-making.

In between these two extremes, the roll-out of rooftop photovoltaic (PV) panels and the ill-fated Green Deal are further examples of attempts to initiate change that combined top-down and grass-roots action. Despite being driven by the same UK government, one initiative was clearly successful, while the other is widely reported as a failure. The impact of the PV tariff can be seen on rooftops throughout the UK, and in the improvements in clean electricity being reported by UK CCC. Key aspects of this success came from the relative transparency of the initiative – a temporary offer of a long-term discount for early investors – and in the way that early impact led to improvements in the quality of future PV, increased awareness of the (cost) benefits, and wider public acceptance of renewables as a visible part of UK communities. The reasons for the catastrophic failure of the Green Deal are harder to pinpoint, but probably relate to the relatively complex nature of homes when seen as a whole, the lack of choice embedded in the scheme (some improvements were ruled out on the basis of payback periods), the somewhat marginal benefits of the scheme (loans carried a relatively high interest rate), and the observation that the scheme's "design and implementation did not persuade householders that energy efficiency measures are worth paying for." (Thorpe, 2016)

The reality is probably that both top-down and grass roots approaches are needed. Re-use and recycling continue to make inroads into our waste production, but also into the way that we view the materials and products we use on a daily basis. Smart meters will increasingly find their way into private homes, under the guise of optimising performance and particularly energy billing. The uptake of electric cars will be driven (pun intended) by regulation, which will in turn reduce cost and improve infrastructure.

It is unclear how best to manage change that impacts in a more negative way on established lifestyles. In particular, there are issues to do with class and fairness. If behaving better (in environmental terms) comes at a relatively consistent cost from one household to the next, the same essential costs will have very different impacts on an affluent middle-class family to the impact they have on a relatively poor working class family. There are, therefore, clear benefits to housing that minimises the cost of behaving better, for example through high efficiency homes that reduce energy use first, and draw energy from low carbon sources second. More importantly though, every household will have different constraints on how much they can change behaviour for the better, whether these constraints be financial, physical, behavioural, or cultural. The mechanisms for either encouraging or enforcing better behaviour will need to be sufficiently flexible to accommodate households with different means at their disposal. Otherwise they risk being ineffective, inefficient or, worse still, punitive.

No-one wants to see a return to rationing, but some of the issues outlined in this report could certainly lead to changes that infringe on our mobility, privacy, choice or independence. What is clear is that for meaningful change to take place, people must value the changes they are making, by understanding the wider impacts or related benefits. The role of education in encouraging better behaviour cannot be overemphasised. The Carbon Literacy Project provides a valuable model for educating stakeholders, and particularly communities, through peer-to-peer training and education. The aim of the programme, which began in Manchester in 2013 and has now reached more than 17,000 individuals, is “to advance the education of the public in the conservation, protection and improvement of the physical and natural environment” through the dissemination of Carbon Literacy.” (<https://carbonliteracy.com/>)

The most meaningful impact that education can deliver is creating a common agenda. This report has identified how the designer’s hands are already tied by the time most housing projects have a brief and a site. Planners and policy makers need to work to this common agenda if homes are to be designed that truly meet the aspirations of WFGA and the Environment Act. And if we, as occupants, do not share that common agenda, many benefits of better homes will be ignored, misunderstood or simply lost.

“A home exists where sentiment and space converge to afford attachment, stability, and a secure sense of personal control. It is an abiding place and a web of trustworthy connections, an anchor of identity and social life, the seat of intimacy and trust from which we pursue our emotional and material needs.”
Steven Segal et. al. (1988)

Traditionally, the home is viewed as a refuge and a sanctuary, a domain under our control and a place where we are free to express ourselves. However the changes described in this essay require an equivalent change in outlook, borne of an understanding that each home is an integral part of a bigger community, and each community plays an active role in a bigger society that must fundamentally change its relationship with the wider systems of climate, ecology and natural resources, if we are to meet the needs of the present, “without compromising the ability of future generations to meet their own needs” (with reference to the commonly quoted World Commission on Environment and Development, 1987). Support must come from within each community to collectively change behaviour. Key tenets of homes that perform better and live up to the aspirations of future generations are a common agenda, collaborative action, and a clearer sense of community cohesion.

Homes that perform better, in the various ways outlined in this report, will inevitably cost a little more to build than homes that are designed and built with a sole focus on capital cost (see section 5.3: capital cost). However, the seven essays have outlined that better homes bring a wide range of benefits in the short, medium and long term. Many of these benefits result directly or indirectly in cost savings.

Fundamentally, we must stop thinking about meeting the needs of future generations as an issue that requires changes to be made *in the future* or *by others*. Collectively we must all rise to the challenge of behaving better today – and in every aspect of living - if we are to affect positive change for future generations and transform the national agenda from ‘doing less bad’ to ‘doing the most good’.

“What if every single act of design and construction made the world a better place?” Living Building Challenge website <https://living-future.org/lbc/>

Guiding principle:

All new homes should be carbon negative and energy positive. Homes should minimise energy use through a combination of efficient fabric, heat from low carbon sources and on-site renewables. A common agenda is needed to drive behaviour change and promote better collective decision-making over personal convenience.

5 Resources

5.1 Six case studies – links to presentations

Six case studies were developed within this project. Each case study was designed to RIBA work stage 3 for a particular type of end user. The case studies are referenced within this report’s seven essays, but are not described in detail. Links are provided below to more complete online presentations for each case study.

end user	designer	focus of innovation	essay	link
Social housing for families and individuals	Feilden Clegg Bradley Studios	Homes with capacity for change, set in a biodiverse living landscape.	4	social housing
Collaborative living for homeless people	Design Research Unit Wales	A combined model for urgent need housing, supported housing and dispersed housing.	4	homelessness
Affordable homes with live work options	Emmett Russell Architects	Flexible, adaptable housing that accommodates change in working practices.	3	live work
Accessible homes for older people	Pentan Architects	Fully accessible courtyard houses for downsizers with ‘space to grow’.	6	older people
Custom-built starter homes	Rural Office for Architecture	A custom-build framework that creates opportunities for self-build, growth + change.	5	starter homes
Housing for people with acute needs	Welsh School of Architecture	Equitable, accessible homes for all, regardless of differing needs.	3	acute needs

Table 5.1: links to online presentations of the six case studies

5.2 Six case studies – energy and carbon

The carbon and energy performance of the six case studies was modelled (using SAP) to two specifications. The first specification complies with current UK Building Regulations. The second meets the requirements set out by the London Energy Transformation Initiative (LETI). The results are below, with observations overleaf.

End user	Dwelling type	Area (m ²)	Compliant with UK Building Regulations Part L				Compliant with LETI pathway to zero carbon			
			Space heating (kWh/m ² /yr)	Total energy (kWh/m ² /yr)	Decarbonisation (% vs 1990)	Heating bills (£ per year)	Space heating (kWh/m ² /yr)	Total energy (kWh/m ² /yr)	Decarbonisation (% vs 1990)	Heating bills (£ per year)
Social housing for families and individuals	4p 2b house	86	46	131	76%	£519	11	69	94%	£502
	3p 2b flat	57	40	145	76%	£417	8	81	93%	£417
	2p 1b flat	43	41	163	75%	£370	9	92	93%	£381
Collaborative living for homeless people	2p 1b flat	48	41	157	75%	£386	9	88	93%	£393
	Studio flat	23	42	234	71%	£312	12	138	92%	£340
	direct access	11	48	418	66%	£284	21	257	90%	£324
Affordable homes with live-work options	5p 3b house	96	40	119	77%	£523	9	64	94%	£499
	5p 3b house	95	42	121	77%	£527	10	64	94%	£502
	3p 2 b flat	65	45	143	77%	£454	11	77	94%	£445
	2p 1b flat	54	32	139	74%	£382	5	82	92%	£398
Homes for older people	2b house	60	56	160	76%	£464	19	83	94%	£456
Custom-built starter homes	5p 3b house	93	43	124	76%	£527	10	65	94%	£499
	4p 2b house	67	43	139	76%	£451	10	76	93%	£445
	2p 1b flat	34	44	187	73%	£347	11	106	93%	£362
Housing for people with acute needs	2b house	112	43	115	77%	£577	10	59	94%	£533
	1b house	67	48	145	76%	£465	13	77	94%	£533

Table 5.2a: Predicted energy and carbon performance for six housing case studies

Observations:

Compliance with current (2018) Building Regulations Part L limits decarbonisation to between 66% and 78% of emissions (versus 1990 levels). This is principally because heating systems are assumed to run on mains gas, a carbon-heavy source of energy.

Compliance with the more stringent LETI standard delivers between 90% and 94% decarbonisation. Combined with modest further improvement in energy supply, this specification would consistently deliver the reduction of greenhouse gas emissions needed to meet international decarbonisation targets.

Decarbonisation targets require a transition to a low carbon source of heat. For the case studies, low carbon heat is assumed to be delivered by a combination of air source heat pumps (ASHP) and mechanical ventilation with heat recovery (MVHR).

Meeting these targets also requires improved fabric performance. Houses have more exposed fabric and are therefore easier to improve than flats. (Flats are consistently predicted to perform worse for decarbonisation).

When the fabric of homes is upgraded to the LETI specification, heating systems can be transferred to low carbon energy with limited impact for occupants (houses tend to perform slightly better, flats slightly worse).

A site-wide assessment of renewables potential indicated that roof-mounted photovoltaic panels (PV) would generate around 378,878kWh of electrical energy across the site per year. A site-wide approach to renewables is more effective because efficiencies can be maximised and losses minimised without expensive battery storage or feeding excess energy back to the grid. It may become easier to optimise performance for standalone housing projects in the future.

Renewables are currently needed to meet decarbonisation targets. They will not be essential to meet decarbonisation targets in the future if energy continues to become cleaner. However, installing renewables (typically roof mounted PV) also reduces heating bills – by an average of £500 per year. This improvement could be critical to decarbonisation being affordable, or desirable, for the occupant.

When the case studies are modelled to current (2018) Building Regulations Part L, on site renewables meet around a third of all predicted energy demand.

When the case studies are modelled to the LETI specification, on site renewables meet two thirds of all energy demand across the site, bringing the scheme considerably closer to net zero without resorting to off-site renewables or carbon offsetting.

Assumptions:

SAP models were produced for the six case studies. Speculative emission factors were assumed for electricity and gas, in order to model future retrofit. Recent work produced by BEIS and the National Grid was analysed (see links below), and their predicted emissions factors for 2023 were incorporated into the modelling (Table 5.2b, below). Whilst these figures are not reflective of *further* potential to decarbonise energy supply in the future, they are considered to reflect a reasonable view of emissions by 2030.

Carbon intensity	Electricity supply (kg of CO ₂ / kWh)	Gas supply (kg of CO ₂ / kWh)
2018	0.248	0.208
2020	0.103	
2023	0.089	
2035	0.041	

Table 5.2b Carbon emission factors

Links to recent work:

National Grid System Operator <http://fes.nationalgrid.com/fes-document/>

BEIS <https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2018>

5.3 Six case studies – capital cost

End user	amount	GFA (sqm)	Cost as a rate (£/sqm)		Total cost
			Construction costs and fees only	Incl. profit, overheads, risk etc	
Social housing for families and individuals	24 homes: 6no 5p3b houses 6no. 4p2b houses 6no. 4p2b flats 6no. 2p1bed	2031sqm	£1,595	£2,110	£4.29M
Collaborative living for homeless people	25 homes: 13no. 2p1b flats 6no. 2p1b studios 6no. direct access accommodation	972sqm	£1,754	£2,319	£2.26M
Affordable homes with live-work options	29 homes: 17no. 5p3b houses 6no. 3p2b flats 6no. 2b1b flats	2409sqm	£1,604	£2,122	£5.11M
Accessible homes for older people	8no. 2 person 1 bedroom homes	500sqm	£1,580	£2,090	£1.05M
Custom-built starter homes	14 homes: 5no. 5p3b houses 5no. 4p2b houses 4no. 2p1b flats Communal space	1310sqm	£1,568	£2,073	£2.72M
Housing for people with acute needs	14 homes: 10no. 1 person flexible units 4no. 2 person flexible units	992sqm	£1,568	£2,074	£2.06M
TOTAL	114 homes plus communal space	8,214sqm			£17.5million

Table 5.3a: Indicative capital costs for the six case studies

Additional cost of site-related works (site area 23,130sqm):

Demolition of existing buildings / site clearance

£1.12M

Landscaping / drainage / infrastructure

£3.58M (£154/sqm)

Comparison of costs with baseline data:

Lee Wakemans, the consultants who costed the HFFG proposals, have estimated the average house building costs for a standard house type within the UK as a range between £1,700/m² and £1,950/m², depending in particular on the dwelling specification / quality.

Estimated cost are also dependant on project location and anticipated start on site date. Currently, the UK market is experiencing an increase in material costs that is anticipated to increase through the remaining quarters of 2021, affecting average build costs.

The average costs noted above include typical percentage allowances for preliminaries (12%), overheads & profit (8%), and design fees (5%). Costs do not include any allowances for external works, abnormals and risk/contingencies (see similar exclusions in costings of the proposals, previous page).

Cost data has been recorded from projects of a similar nature, data requested and discussed with other cost consultancies, BCIS data and published Turner and Townsend international construction market survey reports.

5.4 Glossary

(entries are in alphabetical order):

ARBED	Welsh Government's strategic 'Warm Homes' fuel poverty scheme
ASHP	Air source heat pump – a lower carbon heat source
BRE	Building Research Establishment https://www.bregroup.com/
BEIS	UK government's Department for Business, Energy & Industrial Strategy
CCC	The Committee for Climate Change – a statutory body established under the Climate Change Act 2008 to provide independent advice on setting and meeting carbon budgets and preparing for climate change. https://www.theccc.org.uk/
CHP	Combined heat and power – a lower carbon heat source
DCfW	Design Commission for Wales https://dcfw.org/
Decarbonisation	the reduction of carbon dioxide emissions production, through increased efficiencies, lower carbon energy sources and carbon sequestration
EPC	Energy Performance Certificate
GHGs	Greenhouse gases - compound gases that trap heat in the atmosphere, leading to global warming. Carbon dioxide is the most prevalent GHG.
LETI	London Energy Transformation Initiative: a voluntary network of built environment professionals working towards a zero carbon future for London and the UK. https://www.leti.london/
MMC	Modern Methods of Construction – see Barker Report (2006)
MVHR	Mechanical Ventilation with Heat Recovery provides fresh filtered air into a home, retaining most of the energy used to heat it.
PV	Photovoltaic (panel) – a renewable energy source
RDSAP	Reduced Data SAP was introduced in 2005 as a lower cost method of assessing the energy performance of existing dwelling (see also SAP).
Retrofit	changes to a building's fabric or systems, occurring after construction is complete and the building has been occupied.
RMI	Repair, maintenance and improvement (programme)

SAP	Standard Assessment Procedure – a tool for modelling fuel consumption and energy efficiency, developed by the BRE.
SDGs	The UN Sustainable Development Goals are 17 interlinked global goals developed in 2015 by the United Nations General Assembly as a "blueprint to achieve a better and more sustainable future for all". See https://sdgs.un.org/goals
uPVC	Unplasticised polyvinyl chloride, also known as PVCu, a rigid plastic in widespread use for gutters, windows, fascia boards etc.
WFGA	The Wellbeing of Future Generations (Wales) Act 2015 requires that public bodies in Wales think about the long-term impact of decision making. See https://www.futuregenerations.wales/about-us/future-generations-act/
WG	Welsh Government
WHCS	Welsh Housing Conditions Survey, most recently completed in 2018. See https://gov.wales/welsh-housing-conditions-survey
WHQS	The Welsh Housing Quality Standard is a set of standards that all council and housing association homes in Wales must meet. WHQS is currently under review.
WSA	Welsh School of Architecture, Cardiff University https://www.cardiff.ac.uk/architecture

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