

The vernacular as a model for design:
Design studies for the contemporary Welsh house

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Abstract

This thesis tests Amos Rapoport's theory of 'vernacular design as a model system' through research by design, in order to develop and refine a model for contemporary design.

The vernacular buildings in Wales are used as a foundation for the exploration. The research aim is to develop and demonstrate a design method by which buildings may be distinctive to place. A further aim is to develop a model that may be transferable to other geographical contexts.

The research builds on Rapoport's approach of 'learning through analysis' rather than literally reproducing the past, through abstracting and adapting principles from tradition for contemporary design.¹ A model for design is developed and tested through a series of sequential and linked designs, based on traditional housing typologies relevant to current affordable housing need in Wales and elsewhere in the UK. Supported by literature, contextual and precedent studies they are used to inform, interrogate and refine the model. The primary objective of these investigations is to examine the applicability and appropriateness of a model for use by architects and designers.

The research demonstrates that the vernacular as a model for design as proposed by Rapoport in its redefined form can offer an effective tool to guide design. It reveals that some aspects of the framework are strong such as siting, form, materials and construction, whereas others were found to be much weaker, such as cultural and experiential aspects of tradition. These elements are harder to uncover and are concerned with the subjective as opposed to the objective. The research establishes that these elements of the model are critical to the development of a design process that promotes connection to place.

¹ Amos Rapoport, 'Vernacular Design as a Model System', in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006) p.182

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Ibid., p.87.
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Ibid., p. 104.
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Borasi, Giovanna, *Some Ideas on Living in London and Tokyo*, p.113.
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Building <<http://www.building.co.uk/buildings/stephen-taylor-architects-wins-converts-at-charlotte-road/3110174.article>> [accessed 13 February 2013]
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Borasi, Giovanna, *Some Ideas on Living in London and Tokyo*, p.115.
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Ibid., p.112.
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Borasi, Giovanna, *Some Ideas on Living in London and Tokyo*, p.119.
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Schittich, Christian, *Building Simply Two: Sustainable, cost-efficient, local*, p.35.
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6.0 Terrace Housing

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Kelly, Crispin, 'Pursuit of Happiness', *Architectural Review*, p.38.
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Borasi, Giovanna, *Some Ideas on Living in London and Tokyo*, p.129.
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William, Eurwyn, 'To keep the devil at bay,' *Country Quest*, 35.
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William, Eurwyn, *The Welsh Cottage: Building Traditions of the Rural Poor, 1750-1900*, p.224.
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Brunskill, R. W., *Illustrated Handbook of Vernacular Architecture*, p. 137
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Schittich, Christian, *Building Simply*, p.147.
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Ibid., p.150.

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Herzog & de Meuron 1798-2002, Architecture and Urbanism Special Issue February 2002, p.135.
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Ibid., p.134.
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Schittich, Christian, *Building Simply*, p.32.
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Redrawn by author from Sutton, Andy and others, *Information Paper - Hemp Lime: An introduction to low-impact building materials*, p.3.
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8.0 Findings

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St Fagans: National History Museum
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Ibid.
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Ibid.
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Bebb, Richard, *Welsh Furniture*
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Wilson, David, *Pembrokeshire*, p.17.
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Rapoport, Amos 'Vernacular Design as a Model System', in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga, p.182.
- Fig. 8.20 RIBA Plan of Work 2013 with vernacular overlay
- Fig. 8.21 Rapoport's model system re-evaluated and redefined against the RIBA Plan of Work 2013

1.1 Introduction

The grounds for this study have been derived from an interest in tradition and innovation, which developed through undergraduate design studies and research undertaken in a MArch dissertation, which explored influences of tradition in contemporary Japanese architecture.¹ The dissertation examined contemporary architects' reinterpretations of building traditions in Japan, with focus on the use of materials, and cultural and physical influences upon them. As a continuation of this research, the thesis considers how principles of tradition can be similarly translated and adopted in different cultures and contexts, with specific focus and application in Wales. The investigation is centred in Wales due to the immediate proximity and wealth of available resources to embark on the study, including Iorwerth Peate's *The Welsh House* (1940) and *Houses of the Welsh Countryside* (1975) by Peter Smith.

Paul Oliver amongst many other architectural theorists and architects argues that there is still much to be learned from vernacular buildings. This includes how they 'related to their environmental contexts and available resources, they are customarily owner - or community - built, utilizing traditional technologies. All forms of vernacular architecture are built for specific needs, accommodating values, economies and ways of living of the cultures that produce them.'² This ideology does not follow the planning systems attitude which encourages a stylistic reproduction of the vernacular, to 'sustain character'³ of place, but builds on the theories of Amos Rapoport of the vernacular as a model system for design through analysis of tradition rather than copying.⁴

In *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice* it is urged that there is still much research to be done in the field of vernacular studies:

By critically investigating the achievements and shortcomings of vernacular traditions, and examining the ways in which that which is valuable in the vernacular may be integrated with that which is valuable in modern architectural practice, it will be possible to develop, through upgrading and adaption, those aspects of contemporary built environments that are currently unsustainable or culturally inappropriate.⁵

It is stated that research projects that specifically concentrate on the application and use of vernacular knowledge and skills in architectural practice are still uncommon.⁶

¹ Heidi Day, 'Traditional influences on contemporary Japanese architecture: An investigation into the response of contemporary Japanese architecture to traditional Japanese building, with focus on the use of materials and the cultural and physical influences upon them' (unpublished master's thesis, Cardiff University, 2009)

² Paul Oliver, *Encyclopaedia of Vernacular Architecture of the World* (Cambridge: Cambridge University Press, 1997), p.xxiii.

³ Welsh Assembly Government, *Planning Policy Wales. Technical Advice Note 12: Design* (Cardiff: Welsh Assembly Government, 2009) p.15.

⁴ Amos Rapoport, 'Vernacular Design as a Model System', in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006), p.182.

⁵ Marcel Vellinga, Lindsay Asquith, *Introduction to Vernacular Architecture in the Twenty-first Century: Theory, Education and Practice* (Abingdon, Oxon: Taylor & Francis, 2006), p.6.

⁶ *Ibid.*, p.9.

Present environmental concerns in the UK regulatory system have forced significant change and pushed sustainability to the forefront of design. This has also triggered renewed interest in regional self-sufficiency and the use and production of local resources, as opposed to prevailing pressures of globalisation. It may therefore be relevant to explore the vernacular for solutions to some of these issues and engage in 'a productive relationship between the local and the universal'⁷, tradition and innovation.

The current economic climate and a shortage of affordable housing in the UK has driven a need to search for alternative sustainable options for design. As stated in The Royal Institute of Chartered Surveyors (RICS) Wales Manifesto 2011 'there is presently a particular shortage of affordable homes in Wales'⁸. It is therefore relevant to uncover responses to these issues from the vernacular, which can be re-appropriated for today, in a study focused in Wales.

The thesis attempts to further research in vernacular studies and once detailed evaluations of buildings and their environmental contexts have been made, develop concepts, principles, generalisations and mechanisations for design, based on Rapoport's 'model'. Rapoport states, 'the ability to derive useful lessons requires a certain level of abstraction and requires moving away from the 'natural history stage' to a more problem-oriented, conceptual way of addressing the topic. The potential applicability of such lessons has a major theoretical implication; it leads to a particular view of 'culture', one that is not completely relative but constrained by evolution.'⁹

The model will be tested through design, evaluated and refined to assist in the employment of transferable knowledge from tradition to provide lessons for contemporary design. The research is applied to the current housing situation in Wales and considers economic approaches to designing dwellings that derive from local context, while at the same time being aware of global realities. The knowledge accumulated will be transferable and applicable to diverse vernacular environments and contexts.

⁷ Robert Fabach, 'The significance of Building Culture – Building as Discourse' in *Architecture in Scotland 2006-2008: Building Biographies* (Glasgow: Lighthouse, 2008), p.178-87.

⁸ Royal Institute of Chartered Surveyors (RICS), RICS Wales Manifesto 2011 <<https://www.rics.org/walesmanifesto>> [accessed 3 January 2012]

⁹ Amos Rapoport, 'Vernacular Design as a Model System', in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006), p.183.

1.2 Research context

The ideas of Amos Rapoport on vernacular design as a model system are the basis of the study. His theory is founded on an approach of 'learning through analysis' rather than literally reproducing the past.¹⁰ Many architects and architectural theorists have commented on the subject and are referred to in the thesis, including Bernard Rudofsky in his influential book *Architecture without Architects*, which saw the awakening of vernacular architecture. Architectural historian Paul Oliver has also published a number of books in the field of vernacular studies, most notably the *Encyclopedia of Vernacular Architecture of the World*. A more recent publication *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice* contains a number of significant papers in the research field. Theories of critical regionalism and integral theory discussed by Kenneth Frampton and Peter Buchanan are also significant to the study. They provide comparable yet alternative theories and approaches to designing which are responsive to culture and place. Building projects by contemporary architects in association with these theories on the vernacular are referenced to demonstrate how some of these ideas have been applied in practice.

The thesis also refers to and builds on research and recording of vernacular buildings in Wales, as Rapoport and others contend that much can be learnt from the local tradition. Wales remains particular fertile ground for vernacular studies and there is extensive research and literature available. This includes Iorwerth Peate's *The Welsh House* (1940) and *Houses of the Welsh Countryside* (1975) by Peter Smith, which was developed utilising previous studies by the Royal Commission of Ancient and Historic and Monuments Wales (RCAHMW). More recently *The Welsh Cottage: Building Traditions of the Rural Poor, 1750-1900* was published and *Houses of the Countryside* which accompanied a television series on S4C. There is therefore a considerable amount of research into vernacular houses of Wales, including restored examples and artefacts from across the country displayed at the National History Museum at St Fagans near Cardiff. Built examples of dwellings throughout Wales provide crucial primary sources.

Research into the vernacular in Wales primarily follows an approach of systematic documentation of building form and features, based on type. The reasoning why dwellings were built in a particular way and how and why they have changed over time is often not emphasised or is secondary. This is in addition to the effects of cultural, economic and social change. The lives of the people who inhabited buildings are often studied apart from dwellings they lived in, for example in literature on folklore and in ethnographic studies. They have been omitted from building studies until fairly recently. The current publication *Inside Welsh Homes* (2012) is the first work which focuses on the ways people in Wales inhabited their dwellings and provides an insight into homes beyond the primary architectural form. The research carried out in this thesis intends to draw on past enquiries and further them to encompass multiple aspects of physical, cultural, social and economic environments, promoted in Rapoport's model.

¹⁰ Ibid., p.182.

Research will also include an exploration of examples of contemporary architects' application of tradition in modern architecture. This includes research into the work of David Lea within Wales and architectural practices such as Dualchas Architects, Rural Design and Dominic Stevens, in other Celtic countries. Architects practising further afield including Gion A. Caminada, Glenn Murcutt and Kengo Kuma will also be referred to, as the literature suggests their works relate to the vernacular.

The research will build on the knowledge of the vernacular and methods will be developed and tested into how tradition can be applied as a model system for contemporary design. This will be developed through studies by design. The exploration is relevant to current thoughts in the field of vernacular architectural studies and in its application in architecture. It expands on the theories and concepts of Amos Rapoport and others and tests them in a practical application through design studies that could be applied to present situations. The design principles and outcomes explored in the context of Wales are transferrable to different cultures worldwide. The initial research on tradition is also relevant to research from a historic perspective.

1.3 Aim and objectives

The primary aim is to test Amos Rapoport's theory of 'vernacular design as a model system', through research by design, in order to develop and refine a model for contemporary design, which is responsive to place.

Within this primary aim there are a number of objectives including:

- To apply and test Amos Rapoport's model system in the context of the literature review
- To analyse, refine and articulate the model through design
- To develop and demonstrate methods in which designers can conduct research by design
- To test and establish a robust and legible way to design through applied studies
- To produce a number of designs based on the model as it develops

1.4 Scope and focus

A model developed on affordable housing in Wales will be used as a focus for the research and also provides a model applicable and transferable to other vernacular contexts. In testing the model, the design studies will address current housing needs, affordability and engage with environmental concerns. The thesis focuses on testing an approach to a method of designing, rather than the outcome of each study and progressively builds on the knowledge of the previous studies to inform and redefine the model.

The scope of information on the vernacular in Wales is widespread and the word 'vernacular' has been interpreted and defined in a multiple of ways, sometimes in conflict with one another. The vague and complex word is therefore not discussed in detail and instead particular dwellings and typologies considered by the author to be 'vernacular' in the context of Wales are analysed. Vernacular building here is interpreted as simple yet functional, built for necessity by local people and craftsmen out of materials sourced locally.

The focus will therefore be concentrated on specific housing typologies and particularly the farmhouse and cottage types, described by Eurwyn Wiliam¹¹ and Iorwerth Peate¹² as quintessentially Welsh vernacular. The study will also look at early industrial workers' houses as their initial forms derived from farmhouse traditions. The scope of research in this area is still extensive, so the pilot study on the individual rural house is specifically based on the longhouse. Two further foundation studies concentrate on the live work typology in various forms of the cottage type, followed by study of the terrace, based on early industrial workers' housing. These housing types were selected as parallels can be drawn from traditions that are relevant and applicable to design today. The final design incorporates ideas from these previous studies in a rural edge of settlement group.

Specific buildings were chosen for study primarily for convenience of access and where there was sufficient information to aid in the study. Where there was a lack of research into specific aspects of a building, personal observation was made including detailed recording and measured survey work.

¹¹ Eurwyn Wiliam, *The Historical Farm Buildings of Wales* (Edinburgh: John Donald, 1986), p.16 and p.36.

¹² Iorwerth Peate, *The Welsh House: A Study in Folk Culture* (Burnham on Sea: Llanerch Press, 2004), p.3.

1.5 Method

The purpose of the research is to examine and analyse vernacular buildings of Wales in order to interpret and develop a model system, based on Amos Rapoport's, through a series of design studies. A model for design is continuously developed and tested, further expanding and moving on from Rapoport's model system. Specific vernacular dwellings in Wales are recorded and analysed, through documentation available and personal observation. These typologies are used to test how the model is affected by different circumstances and locations.

A pilot study is carried out to assess and establish a method for the study in which values handed down through tradition can be incorporated into contemporary design. The model is then analysed and refined at various stages through a number of design studies. Literature and case studies are examined throughout the research by design and used to inform the design process. Design will also be used to ascertain where further literature and contextual study is required and where enquiries have been omitted at various stages in the process.

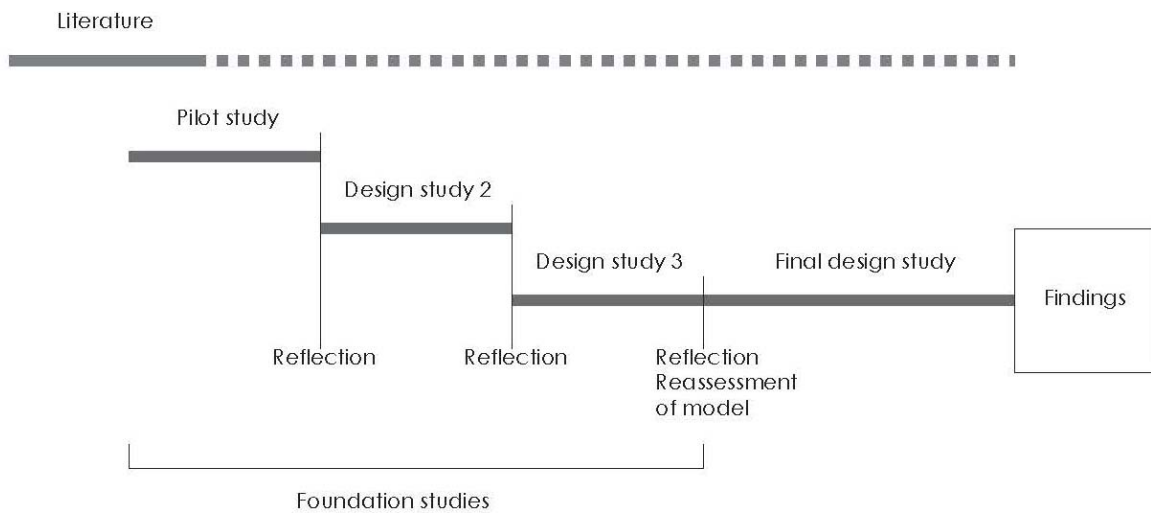


Fig. 1.1 Method of 'research by design' undertaken in the thesis

1.6 Structure

The thesis is structured as follows:

Chapter one introduces the research, states the aims and objectives and gives a brief description of the research method.

Chapter two is a literature review which highlights the primary research carried out in the field of study in terms of the research aims. It begins by defining 'tradition and innovation' in architectural design and explains the use and context of the terms in isolation and together. This is in order to develop an understanding of their meanings and their potential applications in design. The literature review identifies and establishes that tradition and innovation are interconnected, as tradition is a continuing progression of incremental innovations and tradition is instrumental to producing innovations. Innovation may take a number of forms and degrees, but requires a knowledge of what has come before, reinforcing the benefits of learning from the past in contemporary design in the form of Rapoport's model.

Literature on traditions of the Welsh house are introduced, initially identifying how the terms 'traditional' and 'vernacular' will be used in the study. The literature review then focuses on past studies into vernacular dwellings in Wales and illustrates building traditions and regional differences across the country, including particular housing typologies. This is important as it places the focus of the research within its wider context. The way in which traditions are recorded and whether they remain relevant to contemporary design is addressed. It is revealed that there is extensive literature on traditions of the Welsh house. However it is quite narrow and mainly consists of identification of architectural typologies, building features and details, in relation to geography and material resources. There has been little acknowledgement of environmental comfort, functional use or cultural issues until more recently. These aspects are critical to Rapoport's model and will involve further study in this thesis. The literature however reveals specific regional differences and distinctiveness of places in Wales, which have the potential to be retained through the adoption of Rapoport's model which centres on the vernacular.

The following section then involves a summary of architectural theorists' perspectives on learning from tradition in order to inform current building practice. This includes an introduction into issues surrounding localism vs. globalism and theories behind critical regionalism. Principally the literature then explains Amos Rapoport's theory of 'vernacular design as a model system' in detail and introduces integral theory. This section provides a critique to establish the importance of learning from the vernacular in order to present reasoning for carrying out the research. The review of literature on learning from tradition provides a starting point from which to test the research through suggested methods. Literature relating to the value and possible application of tradition in design suggests ideas that architects can consciously employ knowledge of tradition in design. At the forefront to this approach to

architectural design, in which place, distinctiveness and authenticity is important, Rapoport suggests an approach of identifying principles and constructing a model system from the vernacular.

The final section of the literature review considers tradition and innovation in contemporary practice. This is in terms of landscape and context, form, materials and methods of construction, function and economics, and cultural aspects of tradition. Practising architects and designers are referred to in this section, with examples of how they have integrated tradition in recent architectural projects. This provides grounding for the study by establishing what has already been explored in practice, regarding different aspects of design. This final section which addresses the application of tradition and innovation in architectural practice reveals diverse ways architects have re-appropriated tradition in contemporary design. It shows how in reality design is often a more unconscious and unsystematic process than methods proposed by architectural theorists in the previous section.

Chapter three, the research methodology, provides a description and justification of the research methods used as a foundation for the study. It describes the primary aim of the research, which is to test whether vernacular design as a 'model system', proposed by Rapoport, may be developed as an effective tool in the design of the contemporary house. This is tested because the re-establishment of place and traditions appears to be critical to design as understood by a number of theorists including Rapoport and architects such as David Lea and Glen Murcutt.

The development of the methodology is a key part of the research. The model is applied, reflected upon and modified throughout the 'research by design' process. This method is applied as the literature review illustrates that much research undertaken by architectural theorists in the field is of a theoretical nature and lacks a practical application of ideas in design. At the same time many architects have unconsciously or quite loosely applied principles of tradition to design without following a theoretical framework. This thesis therefore attempts to test whether a model for design based on theoretical notions of the vernacular can be effectively applied to design in practice to provide a more realistic model for designers to work from.

Firstly the method in which the study will be executed through design work is explained. Definitions of 'practice based research' and 'design orientated research' are discussed, including a description of a combination of research methods used to clarify the process. It is explained how the designs will be conducted, through initial literature and contextual study in order to establish principles to inform design. The designs are carried out by 'reflection on action' as part of the design process. This expression, discussed by Donald Schön, will be explained in the methodology. The designs are then reviewed and analysed through 'reflection on action' in turn to apply lessons learnt to subsequent design studies. The

methodology describes the structure in more detail and also the scope and limitations of the design research.

Chapters four, five and six make up the foundation studies of the research, focusing on three significant housing typologies from tradition that remain relevant to design today. Chapter four is a pilot study, designed to test a number of aspects of the methodology and research, prior to embarking on the main studies. It addresses the process of the contextual and precedent study, preparation of the model, the design study and how the review, analysis and findings will be developed and determined. The pilot study is performed on the individual rural house, based on traditions of the longhouse typology. This house type is selected for the pilot study as it is often described as the archetypal house of Wales.¹³ It also embodies many typical vernacular traditions that were shaped to meet people's needs at various points in time and in specific localities. The longhouse also relates to a wider vernacular context as it is found in other parts of Europe in slightly different forms. Significantly it is relevant to the contemporary as there is an acute need for affordable housing in rural Wales to meet the needs of society's new and evolved ways of living.

An initial literature and contextual study is undertaken on traditions of the longhouse to provide background knowledge on the type. Three different case study examples are examined to identify commonalities and variation in the type. Traditions from the three examples, are identified and analysed under five headings. These are established in the methodology from the literature to include both physical and human attributes of the traditional house form. Three contemporary case studies of the rural house are then identified and analysed to demonstrate built exemplar projects, which adopt lessons from the vernacular in innovative ways. The contemporary precedent illustrates diverse approaches, despite briefs and sites being similar. A model for design through the identification of principles is established from examples of tradition and innovation to then test in design. A potential brief and site is proposed for the design and the process of research by design is presented through the established principles. The final design outcomes are then demonstrated. An analysis and reflection of the model and the design is performed in a design review, which is carried out by external review and in comparison with literature and best practice. This is conducted in order to develop the model and refine it for subsequent studies.

The pilot study therefore sets up a method from which the following studies can be implemented and developed. Chapters five and six therefore follow the same structure as the previous chapter. The model is refined as it evolves and takes different forms in the diversity of the house types. Chapter five is based on the live work typology, informed from traditions of the cottage type. There is a call for study in live work in contemporary design, as there is increased popularity and demand in home based working and benefits in encouraging live work units for sustainability and community. Traditionally work tended to be carried out in or

¹³ Richard Suggett and Greg Stevenson, *Introducing Houses of the Welsh Countryside* (Talybont: Y Lolfa, 2010), p. 81.

nearby the home, which provides a strong precedent from tradition for the contemporary. Chapter six analyses the terrace with particular recognition of early industrial workers' housing. The type has been identified as still relevant to contemporary living to provide a suitable resolution to housing requirements. A number of contemporary architects and practitioners have re-appropriated the terrace demonstrating its significance for today. The early industrial workers' housing in Wales embodies vernacular traditions and provides a housing form where community is important. This chapter follows a similar structure to the pilot study and chapter five. The model is re-evaluated to inform the application of it in the final design study.

Chapter seven is the final study which incorporates and builds on the knowledge developed in previous foundation work. The final study focuses on the design of a group of dwellings on the edge of a rural settlement as a current housing typology that is in demand in rural areas. The brief does not draw on a particular traditional type but uses elements from previous studies. This chapter therefore has a different structure to the foundation studies in light of the developed model which addresses aspects of design which were not adequate in the previous studies. The precedent studies therefore involve a different type of fieldwork and method of learning from practice. The field based research involved interviews with designers Dorian Bowen, Dualchas Architects, Rural Design and David Lea Architects to understand their design principles and processes of work. Subsequent site visits to observe examples of their works are discussed alongside results from the interviews. The fieldwork also entailed participation on the Glenn Murcutt Master Class in Ireland¹⁴. From the preceding research, the model and principles for design are redefined and described in detail. These identified principles are then applied to a final design study. The process work and execution of the final design is then presented in relation to the principles they are based on. The design is finally analysed and reflected upon and findings drawn.

Chapter eight brings the findings from design studies together to then analyse. The outcomes of design and the model as an 'entity' are discussed, followed by the model as a 'process'. In the findings, a method of how to conduct a literature and contextual study through a holistic approach is evaluated and redefined. It highlights the importance of personal observation in connection with landscape and climate, materials and making, form, cultural aspects of building tradition and inhabitation. The findings then address how principles can be utilised in design in practice and identifies the difficulties and outcomes of following a model for design. The process of analysis and reflection is also interrogated. Amos Rapoport's model system is then interrogated and re-evaluated in light of the findings for use by designers. Possible further work on the subject is then proposed.

Chapter nine is the bibliography.

¹⁴ Glenn Murcutt Master Class in Ireland, attended in April 2011 and led by Richard Lepplatrier, Peter Stutchbury, Juhani Pallasmaa and Lindsay Johnston

2.0 Literature Review

2.1 Introduction

In this literature review carried out in parallel with the pilot study, four principle areas of enquiry are identified to provide a background and context for the study. These are:

- definitions of tradition and innovation
- a general discussion of traditions of the Welsh house
- theories surrounding learning from the vernacular
- the incorporation of tradition and innovation in contemporary practice.

The rationale supporting these is as follows:

In the first section a general definition of tradition is given alongside specific interpretations of the word from various fields, including architecture in particular. This is carried out because the term is vague and does not have a definitive meaning. It is open to multiple interpretations and associations, which are considered in order to define how the expression will be adopted in the thesis. The word tradition is discussed in relation to evolution and progress and its changing nature. Tradition is also considered in association with creativity and its interconnection with innovation. Innovation is then defined quite generally and types of innovation are identified including product, process, technological, organisational and social innovation in relation to different fields of research. An understanding of different types of innovations emphasises how new ideas can be adopted in different aspects of design in the thesis. Scale of innovations and the motivations behind innovation is discussed, highlighting how slight improvements that build on previous ideas can be just as innovative as something completely novel. This confirms the significance argued in the thesis of developing knowledge from the past through innovations for contemporary design. The review of literature on tradition and innovation is therefore set up to establish methods by which the concepts can be used in the application of architecture and to develop an understanding of the interrelationship between the two notions.

Literature on traditions of the Welsh house is examined in the next section to gain background knowledge and fulfil the research aims to test 'vernacular design as a model' in the context of Wales. Wales is the immediate setting in which the thesis is carried out so provides an accessible wealth of information to execute the study. This section of the literature review is performed to explore whether traditions in Wales appear to be recorded and in what form and to what extent they are. This is with the objective to determine the relevancy of the literature to contemporary design. Initially the meaning of the terms 'traditional' and 'vernacular' are defined in relation to the thesis through reference to theorists' definitions involved in vernacular studies. This is important because the use of the expressions is often unclear and conflicting. The review demonstrates how the term will be used in the research. The principle literature on the vernacular in Wales is then listed to establish what information

exists and what may require further investigation. A brief introduction to vernacular building traditions in Wales is given, with acknowledgement of regional differences, so housing typologies discussed as relevant to the study can be understood within a wider context.

Architectural theorists' philosophies on learning from tradition for contemporary design are collated and analysed in the next section of the literature review to determine the value and benefit of extracting lessons from the vernacular. A summary of issues surrounding conflicts between localism and globalism are analysed to highlight that a balance must be attained in order for cultures to continue to exist and remain rooted to their locality. Theories behind critical regionalism are examined, as the ideas address issues of localism vs. globalism and an alternative approach to design that incorporates similar principles to those held in Amos Rapoport's model system. Rapoport's theory of vernacular as a model for contemporary design is then discussed in depth as a foundation for the thesis. Ideas of the use of integral theory in architecture are introduced to compare another framework for design to Rapoport's model and critical regionalism.

Tradition and innovation in contemporary practice is finally considered in the literature review, to determine whether practising architects actually design with tradition in mind and if so how they go about it. The architectural practices considered in this section are primarily those whose works are found on the edge of urban conurbations on the western fringes of Britain and Ireland, in addition to a number of exemplar architects practising worldwide. The design practices analysed evidently make reference to tradition in their works or have been identified by critics in publications as doing so. Aspects of tradition that have influenced the contemporary architects referred to are observed and discussed under a number of headings including landscape and context, form, materials and methods of construction, function and economics and cultural aspects of tradition. Practising architects and designers are referred to in this section with examples of how they have integrated tradition in recent architectural design projects. A matrix of case studies by a wide range of architects is drawn up in order to compare the different approaches to design. These are categorised under a number of key design principles. This highlights the scope and varying approaches to tradition and innovation in contemporary practice, from the more literal application through to more abstracted concepts of tradition.

2.2 Tradition and Innovation

2.2.1 Introduction

This section introduces the terms tradition and innovation as two very contrasting concepts with strong distinctions between them, but highlights how the two themes are interconnected and incomplete without consideration of the other. Tradition or an existing invention informs innovations, and tradition is built on a continuous process of innovation. The terms, tradition and innovation are employed in a range of subject fields, interpreted in multiple of ways and are discussed alongside their associations. This chapter attempts to define tradition and innovation as a general definition with particular reference to architectural design and contemporary practice. There is reference to its use in other fields to help define the term in architecture and for use in this thesis.

2.2.2 Definition of tradition

The word tradition derives from the Latin *traditionem*, which is the accusative case of *traditio* which means 'handing over, passing on'. The Concise Oxford Dictionary definition of tradition is:

Tradition: n. 1. Opinion or belief or custom handed down, handing down of these, from ancestors and posterity.¹

Philosopher Francis Bacon in his book *Of the Proficiency and Advancement of learning, Divine and Humane* first published in 1605 wrote, 'the expressing or transferring our knowledge to others... I will term by the general name of tradition or delivery'.² He describes tradition as having three elements, the first concerning the 'organ' of tradition, meaning speech or writing, the second the method of tradition and the third concerning the picture of tradition.³ This demonstrates that tradition can be the passing on of knowledge through either word or text, through the process of doing or making, or through object or image.

Tradition is commonly described as a universal process of handing down, strong and often well established customs, beliefs and stories. The popular use of the word tradition however, is often presumed to mean something old and fixed in time to the past and it is not always considered as a gradual evolutionary process. Tradition however in this thesis is significantly recognised as part of a natural process of development.

Poet and literary critic T. S. Eliot understood the benefit of cultural continuity and observes that without connecting to the past through tradition, work may be superficial and have little meaning to the present. He claims of tradition that:

¹ The Concise Oxford Dictionary (Oxford: Oxford University Press, 1964)

² Francis Bacon, *Of the Proficiency and Advancement of Learning* (London: William Pickering, 1840), p.206.

³ *Ibid.*, p.206.

It cannot be inherited, and if you want it you must obtain it by great labour. It involves, in the first place, the historical sense... and the historical sense involves a perception, not only of the pastness of the past, but of its presence; the historical sense compels a man to write not merely with his own generation in his bones... This historical sense, which is a sense of the timeless as well as of the temporal and of the timeless and of the temporal together, is what makes a writer traditional. And it is at the same time what makes a writer most acutely conscious of his place in time, of his contemporaneity.⁴

T. S. Eliot in relation to poetry acknowledges the necessity to attain a deep and meaningful understanding of tradition up until the present, in order to be aware of one's position in time.

Specific to architecture, Simon Bronner states that, 'Tradition can be both subject and object; tradition shapes building and buildings embody traditions.'⁵ He draws particular attention to the changing and varied state of tradition and how the process of adaption should be realised.⁶ The term 'traditional' differs from tradition as it represents an object or lifestyle at a certain period in time, distinctive to a particular locality, shaped by resources available. It relates directly to the development of techniques and knowledge. The word, however, often has primitive associations and is not always considered in relation to its progress and innovation as the term tradition is.

2.2.3 Evolution of tradition

Built environments have continuously been developed, gradually and subtly over time, through constant reflection and evolution, leading to change and innovations, which ultimately form traditions. This evolution of tradition changed from the beginning of the mid nineteenth century as designers and builders started to break away from a practice which subtly built on the past, to a changed approach involved in producing new form and content. This was prompted by the industrial revolution, in developing new materials and techniques and means of transporting them. Travel was previously a privilege of the rich, but became accessible to many including the working classes. 'Building materials could be transported over long distances: Welsh slate and cheap bricks began to appear in parts of the country where formerly only local building materials had been used.'⁷ The high cost of transport meant where possible local materials were exploited, but increasingly new canals and railways were utilised making transportation of materials easier and cheaper.⁸ 'A further spur to the use of non-local materials was the High Victorian craze for varying colours and textures in a façade.'⁹ Architectural style and form became more important and widespread, 'the house not only reflected the social position of its occupant: it could also suggest the social position to which

⁴ T. S. Eliot, 'Tradition and the Individual Talent' in *The Sacred Wood: Essays on Poetry and Criticism* (London: Methuen & Co. Ltd., 1934), pp.47-59 (p.49).

⁵ Simon Bronner, 'Building tradition: Control and authority in vernacular architecture' in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, e.d. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006), pp. 23-45 (p.24).

⁶ *Ibid.*, pp.23-45.

⁷ Roger Dixon and Stefan Muthesius, *Victorian Architecture* (London: Thames and Hudson, 1978), pp.8-10.

⁸ *Ibid.*, p.15.

⁹ *Ibid.*, p.15.

he aspired.¹⁰ Vittorio Magnago Lampugnani, Architect and Professor of History of Urban design at the ETH Zurich, Switzerland believes this process of change in history is irreversible, but it doesn't mean taking a step backwards. He suggests,

to start looking at the present again not as an autonomous phase, detached from evolution by a revolutionary outburst, but as an integral part of tradition to be rediscovered and re-appropriated.¹¹

He perceives that the present is connected to the past, and is part of more than three thousand years of history in terms of architecture and urban planning, belonging to everyone as a collective work constructed over time.¹² This thesis argues for a continuing of this process of evolution of tradition to retain a connection to the past rather than being removed from place and time.

2.2.4 Dynamic nature of tradition

Tradition is expressed as not being fixed to a point in time, but dynamic and progressive by Marcel Velliga and others in *Vernacular Architecture in the Twenty-first Century: Theory, Education and Practice*. It is seen as changing and varied as it is continuously transferred and adapted from generation to generation.

Emre Demirel discusses in the article 'The Renewable Tradition: Le Corbusier and the East' how Hannah Arendt, German-Jewish political theorist considers:

tradition neither belongs to past nor to future, it continuously renews itself between past and future while reconciling them; it is more the desire for completion, and determines itself as no longer and not yet. It is no longer because it is not representation of past images any more and it is not yet as it still carries potential for the future nor the past, but enduringly it fills the gap between past and future.¹³

Demirel comments that approaching tradition in this way can lead to architectural inventions.¹⁴ Similarly Le Corbusier defines tradition as, 'a continuous sequence of all innovation, therefore the most reliable guide to the future. Tradition is like an arrow pointing to the future, never to the past. Transmission – tradition's real meaning, its reality.'¹⁵ Le Corbusier did not regard tradition as an entity bound to a particular time; he saw it as an emotional experience forever continuing and renewing, rather than representing tradition as reality in the surface appearance of forms.¹⁶

Tradition is also considered as a creative process significantly by Simon Bronner who states, 'Creativity and tradition are intertwined, and represent the complex processes of humans

¹⁰ Ibid., p.30.

¹¹ Vittorio Magnago Lampugnani, 'Tradition' in *Crucial Words: Conditions for Contemporary Architecture*, ed. Gert Wingårdh and Rasmus Wærn (Basel: Birkhauser Verlag, 2008), p.166.

¹² Ibid., p.168.

¹³ Emre Demirel, 'The Renewable Tradition: Le Corbusier and the East', *Architectural Research Quarterly* 13 (2009) 241-250 (p.249).

¹⁴ Ibid., p.248.

¹⁵ Le Corbusier, *Talks with Students* (New York: Princeton Architectural Press, 1999), p.31.

¹⁶ Demirel, 241-250.

expressing themselves to others in ways that carry value and meaning.¹⁷ He discusses the progression of tradition with particular emphasis on issues of creativity, innovation and authority. Bronner argues that tradition is about socially accepted values over time and through regular use rather than because of constraint.¹⁸ It is once these innovations and adaptations have been socially accepted and integrated into life that they become part of the tradition. Innovation and creativity of tradition can happen at a collective level and at an individual scale. As Marchand observes combining tradition and innovation to the built environment will enable it to remain meaningful¹⁹ and maintain an appropriateness of place and local cultural identities.

Therefore from the literature it is recognised that the term tradition can be both a process and entity formed from knowledge or customs handed down. The literature emphasises the gradual, progressive and changing nature of tradition and its associations with creativity. The individual and collective adoption of particular customs make them part of traditions of a place, which contribute to creating identity and meaning to place. The literature confirms the importance of a continuation of tradition in design as well as its acknowledgement in other fields, to retain a connection to the past, while being grounded to the present. This validates the methodology of developing a model from tradition for contemporary design.

2.2.5 Definition of innovation

The term innovation is open to many interpretations and is used by a range of industries to describe vastly different things. In essence innovation is defined simply as, to 'bring in novelties; make change in.'²⁰ It derives from the Latin *novus*, meaning new.²¹ There is nothing specific to qualify how pioneering the novelty needs to be; only that it should be an improvement on a previous version.

Theorists have attempted to define innovation as a general term and there are similarities between them, but also some small inconsistencies. General definitions of the term have been interpreted to relate to particular fields of study and specifically to certain subject matters in sectors including economics, business, entrepreneurship, design, technology, sociology and engineering. The definitions from these subject areas are used to increase the understanding of the definition of innovation within architecture and in relation to this thesis.

¹⁷ Bronner, p.26.

¹⁸ Ibid., pp.26-7.

¹⁹ Trevor Marchand, 'Endorsing indigenous knowledge: The role of masons and apprenticeship in sustaining vernacular architecture – the case of Djenné' in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006), pp.46-62.

²⁰ The Concise Oxford Dictionary (Oxford: Oxford University Press, 1964)

²¹ Collins Gem English Dictionary (Glasgow: HarperCollins Publishers 1997)

2.2.6 Types of innovation

Economic innovation was identified by Joseph Schumpeter, an economist and theorist in the 1930s. He was one of the first to classify innovation in *The Theory of Economic Development* (1934). He defined innovation as a practice of 'creative destruction'²², and considered it the stimulus of economic development. Schumpeter regarded innovation as including 'new commodities, new technologies, new sources of supply and new types of organisation'²³. He principally identified five types of innovation:

1. The introduction of a new good - that is one with which consumers are not yet familiar - or of a new quality of a good.
2. The introduction of a new method of production, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling commodity commercially.
3. The opening of a new market that is a market into which the particular branch of manufacture of the country in question has not previously entered, whether or not this market has existed before.
4. The conquest of a new source of supply of raw materials or half manufactured goods, again irrespective of whether this source already exists or whether it has first to be created.
5. The carrying out of the new organisation of any industry, like the creation of a monopoly position or the breaking up of a monopoly position.²⁴

These descriptions show innovation can happen physically, in products and also in processes and the organisation of firms. Schumpeter also identified the significance of connections between different types of innovation including managerial, organisational, social and technical.²⁵

Product innovation can include a new or improved product which differs significantly from previous products, but it may be result of enhanced knowledge, new use of technologies or materials. Process innovation is the adoption of new or significantly improved production methods, including methods of product delivery.

Technological innovation is defined by Tannenbaum as the 'novel application of physical knowledge and technique to make premeditated changes in the physical aspects of the environment.'²⁶ Peter Drucker's perspective on the definition of technological innovation differs slightly as he describes it as being a deliberate attempt to adjust through technology

²² Joseph Schumpeter, *Capitalism, Socialism and Democracy* (London: Allen and Unwin, 1947), pp.82-85.

²³ *Ibid.*, p.84.

²⁴ Joseph Schumpeter, *The Theory of Economic Development: An enquiry into profits, capital, credit, interest and the business cycle* (Cambridge, MA: Harvard University Press, 1961), p.66.

²⁵ James Simmie, 'Innovation and Agglomeration Theory', in *Innovative Cities*, ed. by James Simmie (London: Spon Press, 2001), pp.11-52 (p.18).

²⁶ Robin Roy and David Wield, *Product Design and Technological Innovation* (Milton Keys: Open University Press, 1986), p.22.

how people live.²⁷ Both definitions stress the larger impact to the physical environmental and social change that is brought about through technological innovation. The definitions regard innovation as premeditated and planned. They also suggest that the changes intended through innovation are already known. There is no reference or consideration in the definitions of an unexpected outcome as a result of being innovative. However Patrick Kelly et al. claim that most innovations do not happen through inspirational thoughts of social change, but rather through routine factors concerning costs, resources, governmental pressures etc.²⁸ Kelly also notes that innovations may bring about changes other than those foreseen by innovators.²⁹

Organisational innovation requires new or improved organisational structures, management techniques or strategies. The level of innovation of work produced within a firm is reliant on the organisation and management of a firm. Peter Rice recognises that 'communication is the key to progress.'³⁰ A firm's progress can be restricted in many ways by management technique.

In general, social innovation refers to new concepts, plans and organisations, which satisfy social requirements and develop and enhance society. This includes living and working environments, health, education and community involvement. Social invention is defined by Kuznets as 'new methods of inducing human beings to compete and cooperate in the social process.'³¹ Architects may be required to be social innovators to be able to react to the needs of the community and place. Designers can be innovative by ways in which buildings and spaces are designed, to prompt different social situations.

2.2.7 Degrees of innovation

Creativity is typically regarded as the basis for innovation. Innovation involves the incorporation of creative ideas to make a specific or physical difference. Davila et al comment that commonly 'the words creativity and innovation are used interchangeably. They shouldn't be, because while creativity implies coming up with ideas, it's the "bringing ideas to life" ... that makes innovation the distinct undertaking it is.'³² Similarly in terms of organisational innovation Amabile et al propose all 'innovation begins with creative idea... We define innovation as the successful implementation of creative ideas within an organisation...

²⁷ Ibid., p.22.

²⁸ Ibid., p.22.

²⁹ Ibid., p.22.

³⁰ Alan Brookes and Dominique Poole, 'Introduction', in *Innovation in Architecture: A Path to the Future*, ed. by Alan Brookes and Dominique Poole (London: Spon Press, 2003), pp.1-14 (p.7).

³¹ Simon Kuznets, 'Inventive Activity: Problems of Definition and Measurement', in *The Rate and Direction of Inventive Activity: Economic and Social Factors, A Report of National Bureau of Economic Research*, ed. by R. Nelson (Princeton N.J.: Princeton University Press, 1962), pp.19-43 (p.19).

³² Tony Davila and others, *Making Innovation Work: How to Manage It, Measure It, and Profit from It* (Upper saddle River: Wharton School Publishing, 2006), p.35.

creativity by individuals and the teams is a starting point for innovation; the first is necessary but not sufficient condition for the second.'³³

Invention is also seen as the preliminary initiative that prompts innovation. Mansfield defines innovation as the 'first application of an invention'.³⁴ However, innovations don't necessarily occur on the very first application of an invention but can take several applications to produce innovation. Invention in architecture is similarly distinguished from innovation by Brookes and Poole, 'as the process of discovering or creating a novel idea, while innovation is the application or exploitation of an idea...through a deliberate application of knowledge.'³⁵ Innovation is therefore the practical application of an invention and the outcome is not completely known.

There are varying levels of innovation in processes and outcomes. Incremental innovation is an evolutionary change, improvement or refinement of an existing design or product, where risk is low and the reward is a slight improvement. Radical innovation is a revolutionary change where new concepts are introduced, the risk is high but there is potential for a high reward. The Oslo Manual draws distinction between 'new and significantly improved' innovation.³⁶ It does not consider subtle or small change to be innovative. However, Mark Rodgers believes this omission is wrong as incremental improvements can account for a considerable percentage of growth in an economy.³⁷

Categorising innovations as radical or incremental can be a useful way in architecture to understand what innovation is. It shows how the scale of innovation can range substantially as innovations don't have to be completely new. Taking something and changing it slightly can produce even more successful innovations sometimes. Incremental innovations often follow radical innovations resulting in successful refinement of the radical innovation. In architecture most innovation is incremental, using established knowledge and only altering it slightly. Incremental innovation is not necessarily less innovative than radical innovation and it has been suggested that incremental technical innovations can produce dramatic competitive consequences between firms³⁸, along with adding value to technical designs.

Innovation is also considered in terms of heroic and deterministic innovation. The 'heroic' or individualistic viewpoint places more importance on the role of the individual in the process of innovation than any external factors affecting the rate of innovation. The deterministic view maintains that innovation occurs when conditions are favourable; social, economic, and

³³ Teresa Amabile and others, 'Assessing the work environment for creativity' *Academy of Management Journal*, 39.5 (1996), 1154-1184 (pp.1154-1155).

³⁴ Edwin Mansfield, *Industrial Research and Technological Innovation: An Econometric Analysis* (New York: Norton, 1968), p.83.

³⁵ Brookes and Poole, p.1.

³⁶ OECD and Eurostat, *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data* (Paris: OECD, 2005), p.110.

³⁷ Mark Rogers, *The Definition and Measurement of Innovation* (Melbourne: University of Melbourne, 1998), p.7.

³⁸ Kim Clark and Rebecca Henderson, 'Architectural Innovation: The Reconfiguration of Product Technologies and the Failure of Established Firms', *Administration Science Quarterly*, 35 (1990), 9-30 (p.10).

political forces come into play to bring out technological change.³⁹ It is thought that inventions outside the profession are the main drivers for innovation within the profession.⁴⁰ For example, during the 1970's oil crisis, the political and social conditions pushed people to design low energy buildings which were considered extremely innovative at the time.⁴¹ It can be seen that both an individual and/or external influences can encourage innovation.

These ideas are also distinguished by technology push and demand pull. Innovation driven by consumer demand, such as designing a building that completely responds to a client's requirements is an example of deterministic driven theory. The opposite is innovation driven by technology such as a device or system created with the view that clients will be interested and want to buy it. James Simmie claims that to understand innovation it is necessary to understand both the push of new technologies and the relationships between innovative firms and demand of their clients and customers.⁴² This can be related to architecture, as an understanding of client requirements is needed, but also an interest to develop new ideas, methods and technologies that will convince the client to buy into a particular way of doing something. Innovation is therefore not always a simple linear process and is more generally 'a complex interactive process involving multiple links between new science and technology, potential producers and consumers.'⁴³

In the context of this thesis, innovation is identified as a response to a need rather than as an arbitrary objective. Adam Caruso discusses this in the essay *The Tyranny of the New*. Caruso states, 'At the end of the 20th century, with late capitalism accepted as the predominant economic, the ideology of newness has become transparently associated with the workings of the market.' He describes how as 'substantial process becomes increasingly difficult to achieve formal novelty becomes a new focus'.⁴⁴ Caruso contends that the apparent freedoms of late capitalism resulted in architecture as a 'commodified product... subject to tyranny of the new.'⁴⁵ Caruso rather regards a 'more radical formal strategy is one that considers and represents the existing and the known. In this way artistic production can critically engage with an existing situation and contribute to an ongoing and progressive cultural discourse'⁴⁶, as 'it is cultural history that lends architecture continued relevance.'⁴⁷ The thesis considers innovation from a deterministic position relating to specific conditions and need. It focuses on the development of incremental innovation as opposed to radical, where innovation is built on the existing and already known – tradition.

³⁹ Roy and Wield, p.22.

⁴⁰ Brookes and Poole, p.2.

⁴¹ Mirko Zardini, 'Think Different' in *Sorry Out of Gas: Architectures Response to the 1973 Oil Crisis*, ed. by Giovanna Borasi and Mirko Zardini (Montreal: Canadian Centre for Architecture, 2008), pp.41-49 (p.46).

⁴² Simmie, p.42.

⁴³ Ibid., p.15.

⁴⁴ Adam Caruso, 'The Tyranny of the New', *Blueprint*, 150 (1998), 24-25 (p.24).

⁴⁵ Ibid., p.25.

⁴⁶ Ibid., p.25.

⁴⁷ Ibid., p.24.

Therefore from the literature on innovation, the definition can be summarised generally as the implementing of something new. In parallel to the term tradition, creativity is also associated with innovation and is recognised as the basis for innovation. Innovation is the practical application of original ideas. Innovation can be in a number of forms in both product and process and can involve technical, social, managerial and organisational innovation. It may also include different degrees of innovation. The literature reiterates that evolutionary innovation involving subtle refinement of the existing, as through the process of tradition is still considered innovative. This reinforces that the relationship between tradition and innovation is important to theory behind the model.

2.2.8 Summary

This section of the literature review therefore defines tradition and innovation as general terms, within a wide context of research. This is in order to consider and cross-examine the application of the concepts in the thesis. Despite associations with the past, it is recognised in the literature that tradition is a progressive term relating to the passing of knowledge to future generations. The word is expansive as it embraces established beliefs, practices or objects. Tradition is naturally forever changing and continuously added to, as new generations build on previous knowledge. Tradition is therefore part of a gradual progression of innovation and a continuous development of what has come before.

Innovation is simply the improvement or addition of something new as a response to changing need or as a complete novelty. It can be associated with a product, process or technology, organisation or management system or social implementation. Innovation applies to whether a product or process is new or improved and therefore either involves the development of a completely new entity or alternately the progression of existing expertise and skills. It is the implementation or making real of inventions and creative ideas, or commonly the improvement of something that already exists. The degree of innovation can range between either extreme of incremental or radical innovation, showing how a slight refinement of a product or process can result in just as an innovative outcome. Innovation can be determined by specific needs and demand, in addition to the push of new technologies and processes.

The literature review recognises tradition and innovation as interconnected, as knowledge handed down from the past has constantly evolved through incremental innovation. Tradition has developed through gradual adjustments, modifications and improvements, which may appear insignificant, but it is the accumulation of these small changes that have helped to form and develop the built environment. In the context of this study the application of incremental innovation, influenced by demand pull, is central to the research. It is therefore appropriate to continue the practice of gradually adding to existing knowledge, through the application of innovation in various forms. This could be in product, processes, technological, organisational and social innovation, to adapt to advances in society. Through implementing

and re-appropriating knowledge from the past in new ways, a connection is retained, as opposed to the creation of radical innovations detached from place and time.

This therefore reinforces the theories behind Rapoport's model, as it reiterates the relevancy of learning from past knowledge and traditions in contemporary design that can be implemented through various methods and forms.

2.3 Traditions of the Welsh house

2.3.1 Introduction

Study into the specifics of local traditions is required in order to employ vernacular design as a model system, as established by Rapoport.⁴⁸ Accessibility to primary resources and literature in Wales makes it an appropriate choice of location to focus the study. This is in addition to the vast amount of existing research on the vernacular in Wales. Therefore the following section of the literature review examines research on traditions of the Welsh house, to determine the context in which the model will be tested in Wales. The intention is for the refined model to be transferable to other cultures around the world.

The thesis explores examples of 'traditional' or 'vernacular' homes of the lower and middle classes in Wales, and examines how people lived and traditions developed up until the present. The dwellings studied are therefore not the manor houses and stately homes of wealthy landowners, but the humble dwellings of the common people, which encompass the majority of housing. These dwellings relied on building materials available in the area and the skills of local people and craftsmen. They differ from the grander houses designed by architects for the upper-class, where trends, styles and expensive building materials were imported from elsewhere. The vernacular provides equivalent housing exemplars that can be compared with needs of our time in providing affordable houses for the majority of people.

The earliest origins of the houses studied in this thesis date from the fifteenth century onwards. Dwellings dating this far back were likely to have been owned by wealthier middle class farmers and the structures rebuilt and added to over the centuries. The homes built by the lower class of the time were much less substantial and the majority have not survived. Houses built up until the end of the nineteenth century are included in the study where traditional methods of building were continued. However the way in which these dwellings have been and continue to be inhabited is considered up to the present day.

2.3.2 'Traditional' or 'Vernacular' architecture

The terms 'traditional' and 'vernacular' are used to describe the types of buildings researched in this study. The expressions however, do not have definitive meanings that can be directly related to architectural form. Definitions and uses of the terms are often ambiguous and sometimes contradictory.

For the purpose of this thesis and building on the definition of tradition in the previous section, the term 'traditional' is used simply to describe something formed through knowledge and skills

⁴⁸ Amos Rapoport, 'Vernacular Design as a Model System', in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006), pp.179-198.

developed from previous generations. It can be passed down and refined over time through word of mouth and in practice. Paul Oliver however argues 'that there is no such thing as a 'traditional building', no larger field of 'traditional architecture'. There are only buildings which embody traditions.'⁴⁹ This disregard for the word emphasises how it should not be seen as static entity, but as part of a continuous development of knowledge.

The *Oxford English Dictionary* definition of the adjective 'vernacular' is extensive and the first five entries in the dictionary demonstrate strong associations with language and culture, the second of these entries states:

2. a. Of a language or dialect: That is naturally spoken by the people of a particular country or district: native, indigenous.⁵⁰

The sixth entry is defined in relation to art and specifically architecture:

6. Of arts, or features of these: Native or peculiar to a particular country or locality. *spec. in vernacular architecture*, architecture concerned with ordinary domestic and functional buildings rather than the essentially monumental.⁵¹

In relation to architecture Bernard Rudofsky in *Architecture without Architects* describes the 'nonpedigreed architecture' as being 'vernacular, anonymous, spontaneous, indigenous, rural'⁵². Brunskill, in greater depth states:

the ultimate in vernacular architecture will have been designed by an amateur, probably the occupier of the intended building, and one without any training in design; he will have been guided by a series of conventions built up in his locality, paying little attention to what may be fashionable on an international scale. The function of his building would be the dominant factor, aesthetic considerations, though present to some degree, being quite minimal; tradition would guide constructional as well as aesthetic choice, and local materials would be used as a matter of course, other materials being chosen and imported quite exceptionally.⁵³

The *Oxford Dictionary of Architecture* defines vernacular more generally, but particularly in terms of building typology:

Unpretentious, simple, indigenous, traditional structures made of local materials and following well-tried forms and types, normally considered in three categories: agricultural (barns, farms, etc.), domestic, and industrial (foundries, potteries, smithies, etc.).⁵⁴

It is demonstrated that the definition of vernacular is a complex term and is subject to active debate, with several definitions currently in use, often vague and each with differing emphasis

⁴⁹ Paul Oliver, *Built to meet needs: Cultural issues in vernacular architecture* (London: Architectural Press, 2006), p.161.

⁵⁰ Oxford English Dictionary Online

<<http://www.oed.com/view/Entry/222608?redirectedFrom=vernacular#eid>> [accessed 11 January 2013]

⁵¹ Ibid.

⁵² Bernard Rudofsky, 'Preface' in *Architecture without Architects: A Short Introduction to Non-Pedigreed Architecture* (New York: Doubleday & Co., 1964)

⁵³ R. W. Brunskill, *Illustrated Handbook of Vernacular Architecture* (London: Faber and Faber, 1971), pp.25-6.

⁵⁴ James Stevens Curl, *Oxford Dictionary of Architecture* (Oxford: Oxford University Press, 1999), p. 706.

and some in contention.⁵⁵ Simon Unwin in his thesis *Notions of "Vernacular" in Architectural Writing in Britain since 1839* writes that 'the word 'vernacular' has been used in different ways by different writers in reference to different kinds of architecture. And hence the word's role in the vocabulary of architectural writing was more complex than merely being a term of factual description.'⁵⁶ He identifies that vernacular is sometimes used as a 'polemical' term rather than as a descriptive term to argue against a way in which architecture has developed in more recent times.⁵⁷ The term often still carries negative associations with the past, with hardship and a lack of advancement, despite the evolutionary process out of which vernacular buildings have developed.

Vicky Richardson in the book *New Vernacular Architecture* draws attention to the use of the term vernacular alongside the word architecture and states that:

Vernacular architecture is surely a contradiction in terms... it is the unconscious work of craftsmen based on knowledge accumulated over generations – the very opposite of architecture, which involves a premeditated design process with a conscious appeal to the intellect.⁵⁸

The term 'vernacular' in this thesis simply uses the general definition from the *Oxford Dictionary of Architecture* to describe the simple, ordinary buildings constructed by local people from materials available, using knowledge and techniques through tradition, as a response to a particular environment and reflecting the customs and lifestyles of a community. In this thesis, vernacular buildings are not necessarily considered to have been constructed by the people who dwelt in them, as described by Brunskill, but to include those built by local craftsmen also.

There is an understanding of the progressive nature of the vernacular and incorporation of modern developments within the tradition. Vellinga argues 'the vernacular does not stand still, but continues to influence and enhance the world we live in'⁵⁹ as customs have evolved with time and continue to do so. He proposes that a wider scope of buildings should be regarded as vernacular in the sense that they are 'distinctive cultural expressions of people who live in or feel attached to a particular place or locality'⁶⁰. He explains that by widening the category of the vernacular, it becomes superfluous, but in doing so it eliminates the associations of the term with the past, to enable it to be accepted and recognised for the future.⁶¹ The research is not concerned about the authenticity of the vernacular, but rather the development of it up to the present. It recognises that aesthetic considerations and choice are an important aspect of the vernacular, opposed to Brunskill's functionally orientated definition.

⁵⁵ Paul Oliver, *Encyclopaedia of Vernacular Architecture of the World* (Cambridge: Cambridge University Press, 1997), pp.xxi-xxiii

⁵⁶ Simon Unwin, 'Notions of "Vernacular" in Architectural Writing in Britain since 1839' (unpublished doctoral thesis, Cardiff University, 1988), pp.9-10.

⁵⁷ Ibid.

⁵⁸ Vicky Richardson, *New Vernacular Architecture* (London: Laurence King, 2001), p.6.

⁵⁹ Marcel Vellinga and Lindsay Asquith, 'Introduction' in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006), p.xvi.

⁶⁰ Marcel Vellinga, 'Engaging the Future: Vernacular architecture studies in the twenty-first century' in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006), p.90.

⁶¹ Ibid., pp.81-94.

2.3.3 Studies in vernacular architecture in Wales

The majority of interest in Welsh architecture before the end of the nineteenth century was in the country's unique structures such as castles, monasteries, churches and manor houses. The architectural and social importance of the Welsh House was only recognized towards the start of the twentieth century, apart from rare mentions of the humble dwelling in antiquarian and historical tour and guidebooks.⁶² *The Old Cottages of Snowdonia* (1908) by Harold Hughes and Herbert North was the first publication to represent vernacular houses in Wales and specifically the type found in upland North Wales.

Iorwerth Peate's *The Welsh House: A Study in Folk Culture* (1940) was the first study of vernacular architecture to cover all of Wales, defining Wales as a distinctive geographical and cultural entity. He describes his work as being 'based on a field survey and the facts so collected have been supplemented by material from various written sources.'⁶³ The publication was made at a time when 'life in the Welsh countryside was rapidly changing to meet the demands of modern agriculture and traditional buildings were increasingly being abandoned, destroyed or renovated out of all recognition.'⁶⁴ Building traditions were changing from the mid-nineteenth century onwards due to the impact of the industrial revolution. People moved from the rural areas to work on sites of industry and as the industrial revolution progressed, housing costs increased. Cheaper materials were sought from a distance and there was less need for skilled craftsmen. Economic pressures influenced formal architectural ideas to do with order, repetition and composition.⁶⁵ There was greater influence from fashion and more dwellings were emulating 'polite' architecture.

In 1948 St Fagans: National History Museum was opened and the first curator was Iorwerth Peate. Throughout the history of the open air museum over forty buildings consisting of a range of typologies and originally built in various historical periods from across Wales have been re-erected on the site just outside Cardiff.

Specific to the south-east corner of Wales, *Monmouthshire Houses* (1951-54) by Sir Cyril Fox and Lord Raglan illustrates the development and regional characteristics of houses in Monmouthshire, through a comprehensive register of plans, sections, sketches and photographs. A number of subsequent documents produced by the *Royal Commission on Ancient and Historical Monuments Wales* (RCAHMW) similarly concentrate on the study of domestic architecture in the Welsh counties.

Published by the RCAHMW, *Houses of the Welsh Countryside* (1975, revised version 1988) by Peter Smith built on the previous regional studies of the counties by RCAHMW. The overview of

⁶² Paul R. Davis, *Hearth and Home: The Story of the Welsh House* (Little Logaston, Woonton Almeley: Logaston Press, 2009), p.1.

⁶³ Iorwerth Peate, *The Welsh House: A Study in Folk Culture* (Burnham on Sea: Llanerch Press, 2004), p.xxvi.

⁶⁴ Davis, p.4.

⁶⁵ Jeremy Lowe, *Welsh Industrial Workers Housing 1775-1875* (Cardiff: Nation Museum of Wales, 1994), pp.4-5.

historic architecture in Wales is an extensive and detailed survey of various housing typologies, mapped across the country to identify regional variations and differences. It traces 'the spread of architectural innovation across the face of Wales and the development of regionally distinctive types.'⁶⁶ The second edition builds on the knowledge of the first, introducing further considerations, new drawings and distribution maps of new sites previously undiscovered.

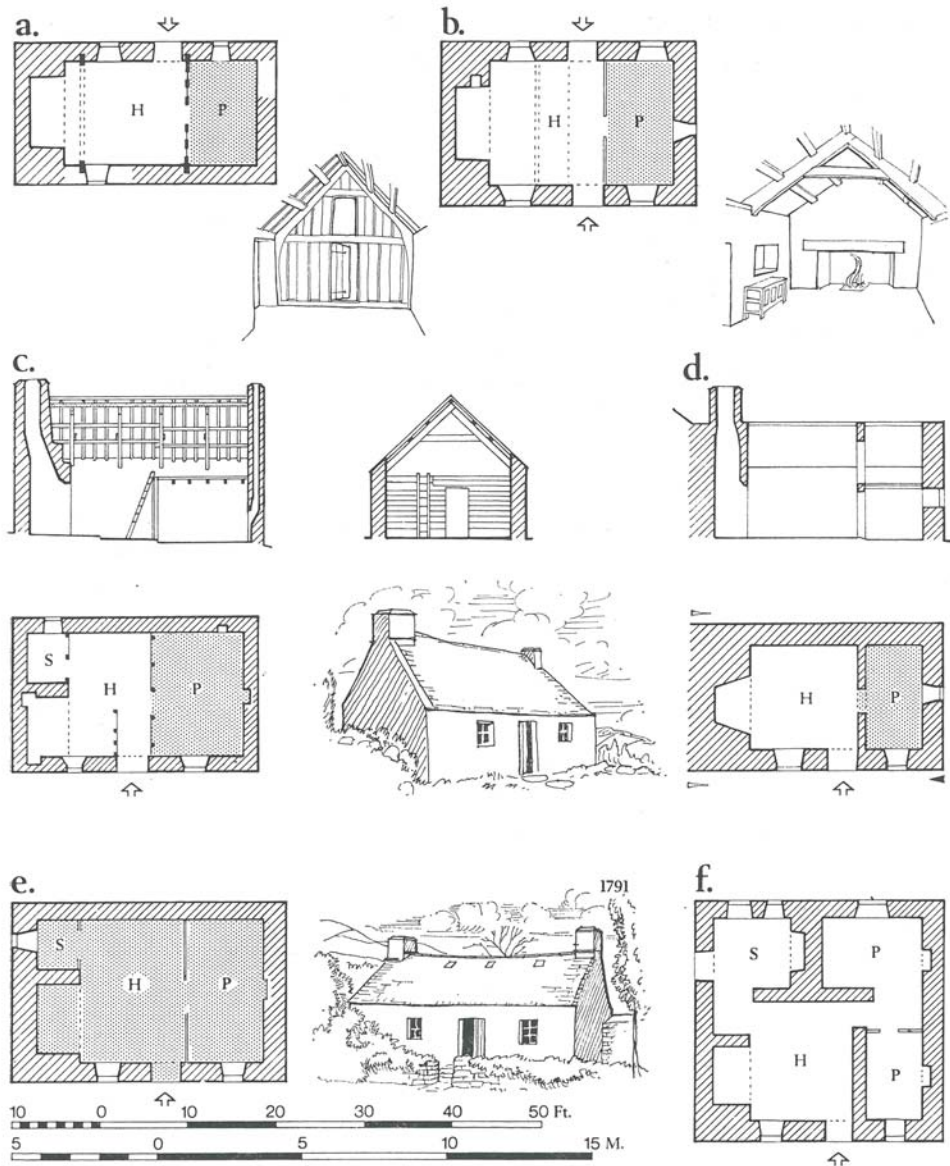


Fig. 183 The three cottage groups resemble types of sub-medieval yeoman and gentry houses, previously illustrated. The commonest cottage (dominant in the west) has the gable fireplace and the entry away from the fireplace (cf Figs. 81-4), as at *a* Tyddyncynnal (Llechweidd, Caerns.), *b* Cae-lloi (Beddgelert, Caerns.), *c* Llain-wen-isaf (Llanychâr, Pembs.), *d* Hafodygelyn (Aber, Caerns.) and *e* Pen-y-bont (Beddgelert, Caerns.). Note the characteristic half loft at *a*, *b*, *c*, *d*, the full loft at *e* and the late single-storeyed 'double-pile' plan at *f* Cefn-coch (Llanddeiniolen, Caerns.). See Pl. 98.

Fig. 2.1 Measured drawings of various cottage types from *Houses of the Welsh Countryside*

⁶⁶ Richard Suggett and Greg Stevenson, *Introducing Houses of the Welsh Countryside* (Talbot: Y Lolfa, 2010), p.12.

Introducing Houses of the Welsh Countryside (2010) by Richard Suggett and Greg Stevenson is 'intended as both an updated introduction to the themes developed in *Houses of the Welsh Countryside* and as a companion to the television series, *Cartrefi Cefn Gwlad Cymru*, which has presented these themes to a wider audience.'⁶⁷ At the same time the detailed study of *The Welsh Cottage: Building Traditions of the Rural Poor 1750-1900* (2010) was produced by Eurwyn Wiliam.

A valuable addition to the research into vernacular houses of Wales is the recently produced *Inside Welsh Homes* (2012) by Rachael Barnwell and Richard Suggett. It highlights how the field of study is moving away from simply concentrating on built form and the architectural features of traditional dwellings, to understanding and appreciating how people inhabited their homes in the past and the innovations which occurred over time.



Fig.2.2 Photograph of the interior of Pen-lôn showing the Welsh dresser surrounded by the family's possessions, including a copy of the Bible from *Inside Welsh Homes*

⁶⁷ *Ibid.*, p.11.

2.3.4 Vernacular Building Traditions of Wales and regional differences

The previous section highlights the quantity and extent of research into the vernacular in Wales. Eurwyn Wiliam suggests that the architectural vernacular of Wales follows two distinct traditions. These are the farmhouse tradition, which includes the great houses of the landed gentry of Wales and the lesser cottage tradition, which represents, principally, the self-built dwellings of the rural poor.⁶⁸ In parallel, Iorwerth Peate describes that in Wales 'the only national architecture is the non-professional architecture'⁶⁹ and that the Welsh expression can be found in the dwelling-houses of the Welsh people, in the farmhouses and cottages.⁷⁰

Peate conveys that although there is a unity and Welsh expression in the houses of the people, there are also regional differences. These are 'according to the climatic and geographical conditions of the locality in which it is found and also according to the social condition of its occupant or builder and his economic status.'⁷¹ The landscape and the natural features of place influence building traditions in Wales and inform the regional variations. There are countrywide similarities, but different house types are more common to particular areas. Significantly, the typologies relate specifically to a region in correlation to landscape, materials available, and knowledge and traditions surrounding the technologies of the local resources.

Predominantly Wales is a mountainous country, 2/3 of the land is above 500 feet and over a quarter of Wales is above 1000 feet, with Snowdonia to the north-west, the Cambrian mountains in mid Wales and the Brecon Beacons to the south. The climate is maritime with small temperature variations throughout the seasons and the weather is often very changeable. The higher ground receives most rainfall of over 90 inches a year with the lower ground receiving less than 40 inches. The main variations in Welsh agriculture similarly occur from lowland to upland, rather than from north to south or from east to west. Soils are mostly shallow and poor, so the most profitable option is growing grass to feed cattle and sheep to produce meat, milk, dairy produce and wool. Sheep are reared on the upper grounds and cattle on the lower richer slopes. The landscape and geology of Wales has influenced the traditional farming practices and locations of settlement, which has informed the building materials and constructions used in the different regions.

The abundance of hard rock in Wales has led to stone being a primary building material, alongside timber. Old hard Silurian sandstones and mudstones, and Ordovician slates cover most of Wales. Old Red Sandstone is found in the south-east, limestone in the south, Pennant sandstone is found in the South Wales coalfields and slates and granites in North Wales. The variations in types of stone between the regions has only influenced slight differences to the building forms and techniques, but greatly influenced the appearance and surface treatment of the stone. Regional diversities include 'thin, slatey rocks horizontally laminated; large, lumpy

⁶⁸ Eurwyn Wiliam, *The Historical Farm Buildings of Wales* (Edinburgh: John Donald, 1986), p.16 and p.36.

⁶⁹ Iorwerth Peate, *The Welsh House: A Study in Folk Culture* (Burnham on Sea: Llanerch Press, 2004), p.3.

⁷⁰ *Ibid.*, p.4.

⁷¹ *Ibid.*, p.4.

igneous rocks; huge rounded boulders from glaciers; soft rocks that have been rendered to keep the weather out'⁷² etc. Timber framed buildings are more common in the north and east of Wales; however the building of cruck frame constructions using large oak trees of a specific profile diminished by the 17th century, if not sooner in Wales.⁷³ The oak woodlands were largely found in the lowlands and were much more abundant in the past. Birch, mountain ash and small oak grew on the valley slopes, but struggled to grow where exposed to strong winds and salt from the Atlantic Ocean.

It is argued by Y.-F. Tuan that tradition is often a product of the absence of choice and Nezar AlSayyad adds 'we must come to terms with the nature of constraint in the practices of the vernacular. We must accept that the gradual change that occurs in vernacular architecture over long periods of time is not of conservative practices and aesthetics but simply of geographic or economic limitations that cannot be overcome by a segment of the local population.'⁷⁴ This is true to a certain extent but as Richard Suggett argues, there was often a degree of choice of materials, construction and plan form, which is not always appreciated and there were also trends as to which materials were commonly used at various times, partly to do with skills of craftsmen.⁷⁵

Wales was essentially a rural nation up until the start of the industrial revolution, when growth of towns and cities exploded, particularly in the extreme north and south. Up until this time the majority of houses were small, simple, isolated cottages and farmhouses. The housing built in the early stages of the industrial revolution continued to be built using traditional methods and materials of rural farmhouses and cottages, but they were constructed in different arrangements and layouts to form streets. This can be seen in the weavers' cottages and in the rows of early industrial workers' houses.

2.3.5 Housing typologies

It is recognised from the existing literature that the study of the vernacular in Wales has specifically focused on categorising housing typologies determined by specific features of buildings. This is particularly apparent in *Houses of the Welsh Countryside* where the regional distribution of house types are identified and categorised in a series of maps. For example the sub-medieval period house types are separated into four main areas of the country with three prevailing types, according to chimney and entry type.⁷⁶ For the purpose of this research the building studies will focus on housing typologies relating to landscape and climate, material

⁷² John and Jane Penoyre, *Houses in the Landscape: A Regional Study of Vernacular Building Styles in England and Wales* (London: Faber & Faber, 1978), p.153.

⁷³ Iorwerth Peate, *The Welsh House: A Study in Folk Culture* (Burnham on Sea: Llanerch Press, 2004), p.30.

⁷⁴ Nezar AlSayyad, 'Foreword' in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006), p.xvii.

⁷⁵ Richard Suggett, 'Timber versus Stone: Preferences and Prejudices in Late Medieval and Early Modern Wales' in *Stone in Wales: Materials, Heritage and Conservation* (Cardiff: Cadw, 2005), p. 70.

⁷⁶ Peter Smith, *Houses of the Welsh Countryside: A study in historical geography* (London: Her Majesty's Stationery Office, 1975), pp.432-3.

and construction, form, culture and function, as opposed to concentrating on specific features and characteristics of the typologies.



Fig. 2.3 Summary of regional house types in *Houses of the Welsh Countryside* of the sub-medieval period

The thesis involves a holistic study of various housing typologies considered 'vernacular', and where there is opportunity for the typology to be re-appropriated for use today. The types studied are identified from a review of literature undertaken throughout the research and include:

The individual rural house, specifically the longhouse with internal chimney and outside cross-passage. This type is found particularly in the upland areas of South Wales and is studied in detail as the 'quintessentially Welsh upland house'.⁷⁷ It is identified as 'B' type in the map of regional house types above.

Workplace dwellings are also explored in the thesis, primarily in the form of the cottage and later weavers' cottages. The cottage, occupied by the rural poor throughout Wales was particularly dominant in central and west Wales where there were large areas of common land. Most cottages which still survive today, were built between 1750 and 1900 and were often reconstructed or upgraded in several phases. They were often occupied by 'masons and carpenters, weavers and stocking-makers, cobblers and clogmakers, and other craftsmen who made an essential contribution to the local economy'⁷⁸, living and working from their dwellings. The single storey cottage commonly had a two-unit plan, with a central doorway, built following the local vernacular building traditions of the area and using any materials the

⁷⁷ Peoples Collection Wales <<http://www.peoplescollectionwales.co.uk/Item/35765>> [accessed 11 January 2013]

⁷⁸ Richard Suggett and Greg Stevenson, *Introducing Houses of the Welsh Countryside* (Talbot: Y Lolfa, 2010), pp.164-5.

occupiers could find locally. During the industrial revolution multi-unit weavers' cottages were built as a workplace and home for the workers.

Groups of early industrial workers' terraces are studied in detail. In the *Encyclopaedia of Vernacular Architecture of the World*, Richard Suggett states that industrial housing was 'initially vernacular in conception and built of local materials.'⁷⁹ From around 1775, the industrial revolution gave rise to the building of rows of cottages to house workers in the iron and coal mines of South Wales and slate quarries of North Wales. The early industrial workers' housing demonstrates the application of local vernacular traditions and a clear relationship with rural farmhouses and cottages. The ways the houses are grouped however reveal the industrial nature of the traditional forms. The dwellings are economical in their means in terms of their compactness, repetition and form and they are made up of standard elements. They are simple and straightforward, in the same way vernacular cottages and farmhouses are.

The literature therefore highlights a range of housing typologies which developed to satisfy a housing need in specific contexts and periods of time. These are relevant to compare against housing demand today and it can be observed that there are lessons to be learnt from the way typologies adapted to the needs of the people at various points in time.

2.3.6 Summary

In summary, a definition of the term vernacular in this thesis is adopted to encompass a wide range of buildings constructed by local people, utilising their specific knowledge of a place and resources available. It is based on an understanding that the vernacular is not fixed in time, but includes modifications and developments in varying forms up to the present.

Literature on traditions of the Welsh house is substantial. However despite this, the scope of research is limited and predominantly comprises identification of building form and specific features. A wider more detailed analysis of traditions surrounding the Welsh house is therefore required to carry out the aims and objectives of this research. However the existing literature and emerging studies which recognise ethnography in relation to building, for example in the publication *Inside Welsh Homes*, provides an important foundation to the thesis.

The review of literature of the Welsh house also draws attention to the diverse regional differences across the country. It reveals different typologies, formed due to the landscape of a place, the materials available for construction and specific needs and ways of doing things unique to different localities. The literature illustrates how vernacular buildings hold distinctiveness to place in the traditions of a region and also on a site specific level. This supports the basis of the thesis in utilising the vernacular to develop a method of designing buildings identifiable and connected to place.

⁷⁹ Richard Suggett, 'Glamorgan, Pembroke (Wales, S, SW)' in *Encyclopaedia of Vernacular Architecture of the World*, ed. by Paul Oliver (Cambridge: Cambridge University Press, 1997), p.1285.

2.4 Learning from tradition

2.4.1 Introduction

In this section, literature relating to the value and use of tradition is described and analysed. Many theorists in the inter-disciplinary field of vernacular studies have reflected upon the importance of studying past traditions, not in isolation but with the intention that research could contribute to new approaches for future development of the built environment. These include studies by researchers from backgrounds in architecture, history, anthropology and geography. Significantly, it is acknowledged in *Vernacular Architecture in the Twenty-First Century: Theory, education and practice* that there is opportunity to learn from the experience, knowledge and skills of vernacular builders, and the ecological and culturally appropriate environments they produce.⁸⁰ This is with a view to identify how vernacular architecture can contribute to the development of appropriate and sustainable built environments for the future. This is while being faced with global challenges of environmental crises and climate change, the exhaustion of resources and increasing housing demands. Studies also focus on the impact of globalisation on issues of cultural identity and place. However, it is important to recognise that not all aspects of the vernacular are relevant today and require development to provide appropriate, affordable and sustainable solutions to current needs, where environmental requirements and cultural circumstances have changed.

Paul Oliver promotes along with others, that we can learn from tradition and states that, 'Traditional wisdom and lore in building, using renewable resources and indigenous skills, may still offer wisely managed, economically effective and culturally appropriate solutions to the world's increasing housing needs.'⁸¹ Bernard Rudofsky similarly describes how vernacular architecture has been developed with awareness and sensitivity to the environment in his book *Architecture without Architects*, which was produced in parallel with an exhibition at the Metropolitan Museum of Art in New York in 1964. He wrote:

There is much to learn from architecture before it became an expert's art. The untutored builders in space and time – the protagonists of this show – demonstrate an admirable talent for fitting their buildings into the natural surroundings. Instead of trying to "conquer" nature, as we do, they welcome the vagaries of climate and the challenge of topography.⁸²

Rudofsky argues that in some respects vernacular builders had 'more practical wisdom than modern man, for what we call his "primitive" dwellings were dwellings governed by ecological factors.'⁸³ Form, orientation, materiality and economical use of local building resources were all a response to the environment and climatic conditions. Through the use of passive strategies, vernacular builders provided comfort in the dwellings. A number of theorists have

⁸⁰ Lindsay Asquith and Marcel Vellinga, *Vernacular Architecture in the Twenty first Century: Theory, Education and Practice* (Abingdon, Oxon: Taylor & Francis, 2006)

⁸¹ Paul Oliver, *Encyclopaedia of Vernacular Architecture of the World* (Cambridge: Cambridge University Press, 1997), p.xxviii.

⁸² Bernard Rudofsky, 'Preface' in *Architecture without Architects: A Short Introduction to Non-Pedigreed Architecture* (New York: Doubleday & Co., 1964)

⁸³ Bernard Rudofsky, *The Prodigious Builders* (London: Secker &Warburg, 1977), p.11.

recognised that there is an opportunity to continue developing these traditions to offer more sustainable solutions for design today.

Lampugnani argues that architects should abstain from following passing styles and trends or imposing their individual ideas on the built environment but:

lean instead on the solid foundations of a collective endeavour built up and proven over time. This requires commitment. Tradition is not hereditary, like nobility; it is earned by study and work. But only from tradition can objects, buildings and cities be born with the quality of durability. Only on the strength of tradition, beyond all superficial formalism, can an authentic style be crystallized.⁸⁴

Over the centuries, small changes and developments have constantly occurred and evolved in the built environment. Lampugnani maintains that it is essential for this continuity, slight modification and progression to be made over time as opposed to hasty, drastic change.⁸⁵

In order to integrate elements learnt from the past in design today, the challenge is in recognising how tradition can be continued and adapted to remain relevant, in terms of cultural, social and technological issues. As Nezar AlSayyad clarifies, it is 'the dynamic interpretation and re-interpretation of this past in light of an ever-changing present'⁸⁶ that should be observed, rather than looking at the past as static entity.

Oliver notes that 'vernacular architecture suffers from the indifference and ignorance of its historic or social value, and from being assigned to low status housing. Vernacular buildings are seen by politicians and populace alike as representative of a backward past opposed to their modern ideas and expectations.'⁸⁷ The simplicity and straightforwardness of vernacular dwellings, and the robust materials and building techniques, has resulted in them often being regarded as ordinary and unremarkable, in comparison to modern buildings, which are viewed as much more sophisticated and prosperous. The buildings that have evolved over time to reflect the environmental, historical and cultural conditions within which they have existed are far from primitive. Instead these have been adapted by people in response to a wide range of issues and changes that have occurred. Vernacular buildings possess intimate associations and interactions with their inhabitants which gives them meaning.

Higher standards of performance and building regulations required, and greater expectations of comfort levels means it is inappropriate to copy directly from past building techniques, but lessons can be learnt from the simple and practical approach to building. When taking lessons from the vernacular the principle challenge is finding methods to integrate traditional knowledge and skill into contemporary building design and practice. This thesis argues that research should focus on the progression of tradition rather than the artefact, and also

⁸⁴ Vittorio Magnago Lampugnani, 'Tradition' in *Crucial Words: Conditions for Contemporary Architecture*, ed. by Gert Wingårdh and Rasmus Wærn (Basel: Birkhauser Verlag, 2008), p.166.

⁸⁵ Ibid., p.165.

⁸⁶ Nezar AlSayyad, 'Forward' in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006), p.xviii.

⁸⁷ Paul Oliver, *Built to Meet Needs: Cultural Issues in Vernacular Architecture* (London: Architectural Press, 2006), pp. 24-5.

develop principles and concepts rather than copying facts and figures. The exploration will be analytical and take into account current requirements and need. It will not be sentimental and linger on the past, but look to the future.

2.4.2 Localism vs. Globalisation

The motivation for continuing to develop traditional customs in contemporary design, aside from the practical and functional reasons, is to maintain the regional characteristics of a place. The advancement of society through the development of technology and increasing communication between countries has led to the world becoming closer to a 'single world civilization', as Philosopher Paul Ricoeur describes in his essay *Universal Civilization and National Culture*. Ricoeur attempts to highlight the conflicts between the development of modernism and globalisation with the wearing away of cultural heritage and local ways of life. He emphasises the benefit and progress universal civilisation brings, but sees that the two situations are both as critical.⁸⁸ He explains that:

The phenomenon of universalization, while being an advancement of mankind, at the same time constitutes a sort of subtle destruction, not only of traditional cultures, which might not be an irreparable wrong, but also of what I shall call for the time being the creative nucleus of great civilizations and great cultures, that nucleus on the basis of which we interpret life, what I shall call in advance the ethical and mythical nucleus of mankind.⁸⁹

He describes that; 'the problem is not simply to repeat the past, but rather to take root in it in order to ceaselessly invent.'⁹⁰ He describes his concern that man will not survive in this world if technology is not exploited; otherwise man's fondness to the past will be a nostalgic 'simple folkloric ornamentation'.⁹¹ For Ricoeur, in order to maintain social values of built environments in a time where 'universalization' of the world is increasing, local traditions are diminishing and there is a loss of diversity, he describes how we must build on the past with consideration of present and future demands.

The literature demonstrates that a balance between localism and globalisation is important because universal modernisation appears to be increasingly undermining characteristics of traditional cultures. The 'universalization' of the world has encouraged the advancement of mankind to continue and develop with an exchange of knowledge between other cultures. The widespread issue of some local materials being of a higher cost than imported versions has resulted in increased trade of materials overseas. As a consequence there has been a decline in construction using native materials and knowledge of local crafts. This has led to the development of 'a "vernacular" costume to hide modern construction; its colours and textures can easily be adjusted to give a regional flavour'.⁹² This style is intended to suggest a

⁸⁸ Paul Ricoeur, 'Universal Civilization and National Cultures' in *Architectural Regionalism: Collected Writings on Place, Identity, Modernity, and Tradition*, ed. by Vincent B. Canizaro (New York: Princeton Architectural Press, 2007), pp.43-53 (p.43).

⁸⁹ Ibid., p.47.

⁹⁰ Ibid., p.51.

⁹¹ Ibid., p.51.

⁹² David Lea, 'Fake or Real?', *Planet: The Welsh Internationalist*, 138, (1999/2000) 77-83 (p.80).

connection with the past, but instead is far from vernacular, as it represents a superficial reproduction of the past, as opposed to being grounded in principles based on the tradition. Notions regarding the façade and ornamentation are widely discussed in modern architecture, for example by Owen Jones, Adolf Loos and others.⁹³

2.4.3 Critical Regionalism

In an attempt to challenge the shift towards a universal civilisation and a lack of identity to context in modern architecture, Lewis Mumford promotes the idea of regionalism. For Mumford regionalism recognises geographical and cultural traditions, while utilising aspects of modernism and engaging with the advancing world. Liane Lefaivre describes how Mumford 'saw regionalism not as a way of resisting globalization, or rather, not completely. Mumford struck a balance between regionalism and globalism,'⁹⁴ believing that regions and communities should be open to other cultures and influences from the rest of the world.

Mumford understood regionalism to be synonymous with modernism and was against absolute historicism and the reproduction of past buildings which have no relevancy to the present.⁹⁵ He stated that 'Our task is not to imitate the past, but to understand it, so that we may face the opportunity of our own day and deal with them in equally creative spirit.'⁹⁶ He felt that it is not a case of using the most locally available building materials or the same construction techniques as used previously because these don't necessarily give the optimal solution. Mumford saw regional forms as 'those which most closely meet the actual conditions of life and which fully succeed in making a people feel at home in their environment: they do not merely utilize the soil but they reflect the current conditions of culture in the region.'⁹⁷ He advocated for the use of the most innovative technologies as long as they were the most functional for their purpose and also environmentally conscious.⁹⁸

Towards the end of the 1970s Alexander Tzonis and Liane Lefaivre identified a number of architects' works that appeared to follow this alternative approach to postmodernism. They readdressed the ideas of Lewis Mumford and referred to his concept as critical regionalism. They regarded it as 'critical not only of globalism, it is also critical of regionalism... It stems from his radically critical thinking of traditional definitions of regionalism.'⁹⁹ Tzonis and Lefaivre also

⁹³ As a result of industrialised methods and materials there was fear that architecture was becoming reduced to no more than a facade. Owen Jones in *The Grammar of Ornament* proposes that 'Construction should be decorated. Decoration should never be purposely constructed', so construction is specific to its purpose and decoration is applied to enhance design in an aesthetically pleasing way. For Adolf Loos in *Ornament is Crime* he proposes for the removal of unnecessary ornament from everyday objects. In practice he finished surfaces internally with elaborate but 'organic' materials. He describes in *The Principle of Cladding* that, 'we must work in such a way that a confusion of the material clad with its cladding is impossible'.

⁹⁴ Liane Lefaivre and Alexander Tzonis, *Critical Regionalism: Architecture and Identity in a Globalized World* (London: Prestel Verlag, 2003), p.38.

⁹⁵ Ibid., p.36.

⁹⁶ Lewis Mumford, *The South in Architecture* (New York: Harcourt Press, 1941), p.18.

⁹⁷ Ibid., p.30.

⁹⁸ Lefaivre and Tzonis, p.36.

⁹⁹ Ibid., p.34.

recognised the value of local sensitivities and traditions, while questioning and reflecting on the specifics of the genuine circumstances of a place in relation to current universal notions.¹⁰⁰

Historian and theorist Kenneth Frampton has since and more prominently written about critical regionalism. The emphasis of his writing on the concept differs slightly from Tzonis and Lefaivre and was first presented in *Towards a Critical Regionalism: Six Points for an Architecture of Regionalism* in 1983 and was then revised in *Ten Points on Architecture of Regionalism: A Provisional Polemic* in 1987. A more complete understanding of the idea is written in Chapter 5 of Frampton's book *Modern Architecture: A Critical History* titled *Critical Regionalism: Modern Architecture and Cultural Identity*.

Frampton refers to Paul Ricoeur's essay *Universal Civilizations and National Cultures* to state his position of the importance of a balance between regional culture and rootedness to place, in conjunction with innovation and modern technology in the design of new architecture.¹⁰¹

Kenneth Frampton's understanding of the term critical regionalism is explained through the works of architects who have lightly represented and reinterpreted the vernacular, within the modern settings in which they are grounded. Frampton questions the universality and homogeneity of modernism, but values the advancing capabilities and solutions it offers. He recognises that local cultures have depended on modernisation and cross cultural exchange of knowledge in order to develop.¹⁰²

Frampton summarises that critical regionalism is a critical category of overlapping elements which embrace and emphasise specific features or attitudes, as opposed to a style. In architectural projects some of the subjects addressed in critical regionalism are more prominent than others or sometimes not incorporated at all.¹⁰³ Frampton reasons that the main points that shape the concept of critical regionalism are as follows. Critical regionalism challenges the ideals of modern architecture, but utilises its progressive nature and technologies. It acknowledges that built form should be considered in relation to surrounding landscape and territory beyond the considered boundary of the site. It is about tectonic form over scenography. In critical regionalism an articulated response to specific characteristics of site, topography, climate and light is encouraged as opposed to an approach which does not take advantage of climatic conditions, but relies on mechanical technologies. Critical regionalism highlights that there should be emphasis on the tactile use of materials and human sensitivity to design in terms of ambience, variations of light, temperature, humidity, sound and smell. Elements of the vernacular should be reinterpreted, involving a separation from tradition in connection with outside influences and through contemporary practice, as 'opposed to the sentimental simulation of local vernacular.'¹⁰⁴ It is identified that critical

¹⁰⁰ Ibid., p.11.

¹⁰¹ Kenneth Frampton, *Modern Architecture: A Critical History* (London: Thames & Hudson, 2007), p.314.

¹⁰² Ibid., pp.314-5.

¹⁰³ Ibid., p.327.

¹⁰⁴ Ibid., p.327.

regionalism tends to progress further in cultures that break away from the pressures of universal civilisation, strengthening regional identity and contributing to the creation of place¹⁰⁵.

Architectural regionalism has been discussed from a diverse range of positions and extensively in *Architectural Regionalism: Collected Writings on Place, Identity, Modernity and Tradition*. Negative associations with regionalism are limited compared with the majority of constructive attitudes towards regionalism. Four principle concerns of architectural regionalism are addressed in *Architectural Regionalism: Collected Writings on Place, Identity, Modernity and Tradition*. These deal with issues of historicism, national romanticism, connectedness of designer to place and the question of authenticity.¹⁰⁶ The question of historicism concerns looking to the past over the future and imitation and copying of style, over invention and utilising precedent as inspiration for the new. There is also a tendency for regionalist practice to be conservative in its expression and there is concern that there is 'tendency to romanticize the past and engage in sentimental nostalgia.'¹⁰⁷ Eggener comments on issues of resistance between people from different backgrounds in search for identity, which causes tensions in society where there is increasing migration.¹⁰⁸ It has also been highlighted that in regionalism there is an endeavour to establish a connectedness to place, however the professional role of the architect involves a knowledge which is generalised and not specific to place. Architects are commonly outsiders to a place and at the outset don't possess any understanding of a site and the wider context. Harding recognises the value of an outsider's perspective and suggests 'just the right contribution of nearness and remoteness, concern and indifference, that are central to maximising objectivity'¹⁰⁹ should be attained. Eggener is sceptical and questions the motives and political vision and goals of regionalism.¹¹⁰

Kenneth Frampton has identified and connected a number of architects who he feels have incorporated some of the ideas of critical regionalism in design, as a way of analysing their work and strengthening the concept. These architects include Jorn Utzon, Tadao Ando, Alvar Aalto and Alvaro Siza. Eggener criticises this method in which Frampton and others have singled out an architect to represent critical regionalism of an area. He believes this approach implies one acceptable regional style. He also highlights how the architect is often selected by someone remote from a particular region. Eggener describes how 'when one individual's image of identity is projected onto the nation, it is important to scrutinize the background, beliefs, and aspirations of that individual and his or her advocates. Built form does not simply reflect culture; it shapes it and therein lies much of its power.'¹¹¹

¹⁰⁵ Ibid., p.327.

¹⁰⁶ Vincent B. Canizaro, *Architectural Regionalism: Collected Writings on Place, Identity, Modernity and Tradition* (New York: Princeton Architectural Press, 2007), pp.23-27.

¹⁰⁷ Ibid., p.25.

¹⁰⁸ Keith L. Eggener, 'Placing Resistance: A Critique of Critical Regionalism' in *Architectural Regionalism: Collected Writings on Place, Identity, Modernity and Tradition*, ed. by Vincent B. Canizaro (New York: Princeton Architectural Press, 2007), pp.395-407.

¹⁰⁹ Sandra Harding, *Whose Science? Whose Knowledge? Thinking from Women's Lives* (Ithaca, NY: Cornell University Press, 1991), p.124.

¹¹⁰ Eggener, pp.395-407.

¹¹¹ Ibid., p.402.

The issue of authenticity is fundamental to regionalism and is based on creating architectural and experiential relations to places, in resistance to the formation of inauthentic replicas of regional or local architecture. It is maintained by Canizaro that 'authenticity is a quality of engagement between people and things or people and places. It is not a property inherent to things or places but a measure of our connectedness to them.'¹¹² It is therefore a lack of participation and engagement of people to their place which results in detachment and disconnection to place. For a form to be authentic it must continue to function with time. Alan Colquhoun argues, 'the real situation is not one of cultural stasis and fulfilment, but of indeterminacy and change, in which a complex, interlocking global economy creates new forms out of old cultures as it goes along - forms whose precise and determinate nature cannot be foretold with any accuracy.'¹¹³ 'Romantic' or 'scenographic' regionalism, 'use the imagery or motifs of authentically regional buildings on modern buildings so they will appear regional', this creates a false sense of belonging.¹¹⁴

The thesis addresses some of the principles of critical regionalism, while being aware of the issues and negative associations of its application and connection with built examples.

2.4.4 Amos Rapoport and vernacular as a model for contemporary design

In *Vernacular Architecture in the Twenty-First Century*, Amos Rapoport proposes vernacular design as a model system for contemporary architecture. He argues that the majority of research into the vernacular has taken the form of a scientific approach, examining and recording different buildings' types and forms, and categorising them. Early studies by architects and historians in Europe and America were influenced by the Arts and Crafts Movement, 'tinged by nostalgia' and regarded for their functionalist aesthetics as precedent for new design.¹¹⁵ The studies overlooked historical and cultural context. Amos Rapoport suggests this research has been in its 'natural history' stage. Simon Bronner, alongside a number of authors in *Vernacular Architecture in the Twenty-First Century*, have expressed the need for research which investigates not just 'why buildings look the way they do and why they are located where they are, but also processual questions of why they came into being and how they changed along the way.'¹¹⁶

Rapoport emphasises the main reason for studying these environments is to understand them, in order to demonstrate how lessons might best be learned. He argues that learning should be made through analysing vernacular environments and applying lessons formed, rather than learning by copying 'certain formal qualities (shapes, massing, details, etc.) often based on a

¹¹² Canizaro, p.26.

¹¹³ Alan Colquhoun, 'Critique of Regionalism' in *Architectural Regionalism: Collected Writings on Place, Identity, Modernity and Tradition*, ed. by Vincent B. Canizaro (New York: Princeton Architectural Press, 2007), pp.141-145 (p.145).

¹¹⁴ Canizaro, p.27.

¹¹⁵ Lindsay Asquith and Marcel Vellinga, *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice* (Abingdon, Oxon: Taylor & Francis, 2006), p.3.

¹¹⁶ Bronner, p.24.

romanticized version of the vernacular'.¹¹⁷ He emphasises the importance of studying buildings within their settings and the cultural landscape that surrounds them, in addition to 'non-fixed elements' such as people, animals and vehicles etc. This is in order to dissociate the vernacular from nostalgia. Rapoport believes that studying traditions in this way can assist in the development of more sustainable settlements and buildings for the future.

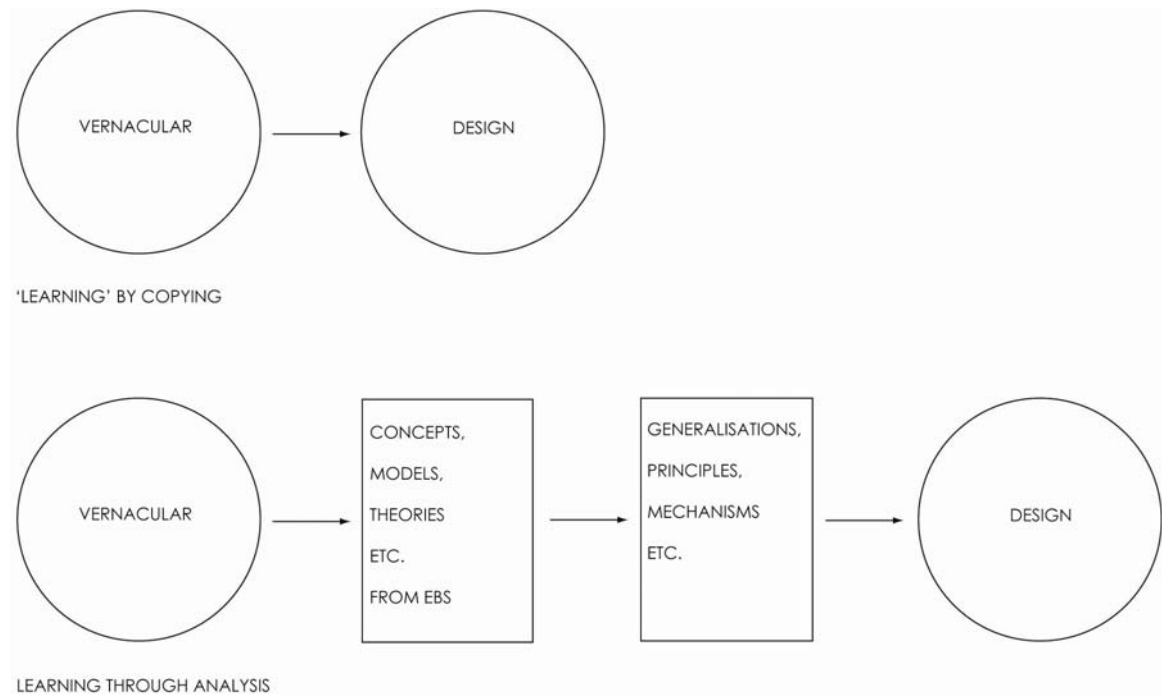


Fig. 2.4 Amos Rapoport's model of 'learning from the vernacular' through analysis as opposed to copying

As buildings, cultural landscapes and people develop, concepts of tradition and the vernacular change. Ronald Lewcock highlights that:

Tradition is a process in which innovation and precedent are dynamically combined and in which, as a result, change continuously takes place. What does remain the same though ... is the underlying presence in the tradition of the generative concept.¹¹⁸

In copying vernacular buildings, an interaction and connection between building form, culture and the landscape is not developed, as the surrounding context has moved on. This suggests that the twenty-first century vernacular must relate to the changing needs of society and a building's inhabitants. Adam Caruso argues that it is 'by sustaining and progressing a cultural discourse that architecture, as a discipline, could continue to be socially significant in an increasingly complex and heterogeneous time.'¹¹⁹

¹¹⁷ Amos Rapoport, 'Vernacular Design as a Model System', in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006), pp.179-198 (p.182).

¹¹⁸ Lindsay Asquith and Marcel Vellinga, *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice* (Abingdon, Oxon: Taylor & Francis, 2006), p.16.

¹¹⁹ Adam Caruso, 'The Ideas Deficit', *Building Design*, 1678 (2005), 11

Rapoport states the importance of studying a wide expanse of environments, vernacular as well as other types of environments throughout history and of all cultures. This is because it alters our perception of basic concepts, allowing for rational cross-cultural comparison, which has an important effect on theory development.¹²⁰

In Rapoport's model it states that once detailed evaluations of buildings and their environmental context have been made, concepts, principles, generalisations, mechanisations etc. can begin to be evolved. Rapoport states,

'the ability to derive useful lessons requires a certain level of abstraction and requires moving away from the 'natural history stage' to a more problem-oriented, conceptual way of addressing the topic. The potential applicability of such lessons has a major theoretical implication; it leads to a particular view of 'culture', one that is not completely relative but constrained by evolution.'¹²¹

Rapoport describes how lessons can be both general and specific, related to a particular location or designed for certain groups. He states that we can draw lessons from responses to climate, energy use, sustainability and the unique nature and characteristics of built environments and how they form and/or strengthen diverse means of identity. Lessons include 'how environments communicate meaning and changes in the levels and types of meaning communicated. Insights can also be gained into the differential importance in that process of fixed, semi-fixed and non-fixed features in different types of environments, different contexts, at different times, for different groups etc'. Studies can include learning from process as well as product, however it is identified that processes of the vernacular are unlikely to influence a contemporary situation.¹²²

Rapoport adds that once these environmental systems are understood principles 'can be sought identified, characterised and studied in, say popular design in contemporary, large scale, complex societies. If necessary they can be modified in light of culture change, for types of environments that do not exist in the vernacular'¹²³ to formulate an approach to design that is relevant at present and can evolve in the future.

This theory and application of the vernacular for contemporary design is the basis for the study and the ideas are applied and tested through design studies.

¹²⁰ Amos Rapoport, 'Vernacular Design as a Model System', in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006), pp.179-198 (p.182).

¹²¹ Ibid., p.183.

¹²² Ibid., p.183.

¹²³ Ibid., p.184.

2.4.5 Integral theory

In a series of essays written by Peter Buchanan, published very recently in *Architectural Review* and titled *Towards a Complete Architecture: the big rethink campaign*, the idea of using integral theory in architecture is addressed. The notion is adopted as a way of seeking 'a more complete architecture informed by a more complete view of what it is to be fully human, as well as to reground both architecture and humankind in history and culture'¹²⁴. It questions the modern and post-modern ideals of architecture in the last century.

The conceptual framework incites a new way of thinking by drawing attention to ignored areas of enquiry, integrating ideas and unexplored relationships.¹²⁵ A configuration of integrated principal themes fundamental to integral theory is presented in the All Quadrant, All Level (AQAL) diagram. The diagram is split into quadrants with the upper two sections representing the individual and the lower two the collective. The left quadrants signify the realm the subjective and the right side that of the objective. Buchanan links the upper left quadrant in architecture to aesthetics and phenomenology, the lower left with culture and meaning, the upper right to do with function, ergonomics, form and construction and the lower right section is in the realm of industrialised systems, ecology and economics.¹²⁶

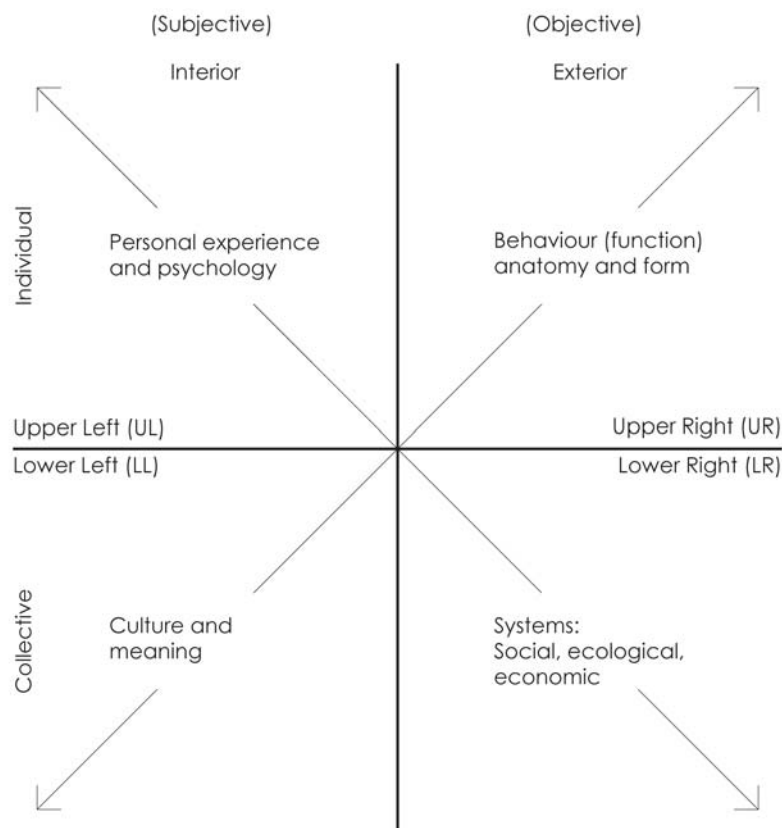


Fig. 2.5 All Quadrant, All Level (AQAL) diagram, integral theory

¹²⁴ Peter Buchanan, 'The Big rethink: Towards a Complete Architecture' *Architectural Review*, 231.1381 (2012), 67-81 (p.68).

¹²⁵ *Ibid.*, p.68.

¹²⁶ *Ibid.*, p.70.

The principle theory behind the AQAL diagram is for the quadrants to have equal emphasis. Buchanan argues that this is critical for the development of sustainability in design. Currently ecological issues in the lower right quadrant and technical matters in the upper right quadrant are fulfilled in contemporary design. However the quadrants on the left which include culture and personal experience are largely ignored.¹²⁷ Buchanan therefore highlights the lack of consideration of human sensibilities and culture in design today, but argues for a holistic approach to design. This underlines the rather weak treatment of ethnographic studies in the literature on the Welsh house.

2.4.6 Summary

The architects and theorists discussed have all principally urged designers to take lessons from the past to inform built environments today. The literature reveals the idea of architects consciously employing knowledge of tradition in design through the identification of principles. The significance of developing a deep understanding of tradition is addressed in order to be able to apply principles that are relevant for the present. It is highlighted that tradition is continually evolving and that it is important to acknowledge the whole environmental settings of place in relation to the past and present. Critical regionalism encourages the use of modern technologies and innovations alongside the continuation of tradition and lists a number of features or attitudes that can be addressed including the setting, ambience and materiality of place. Amos Rapoport believes in a similar way that principles from tradition can be abstracted and incorporated into contemporary design through constructing a model system. Integral theory however promotes a more holistic way of designing that touches on a range of aspects of tradition and innovation relating to human and technological issues, rather than focusing on certain principles or themes.

Amos Rapoport's model for design will be the focus of the thesis as it explicitly describes an approach to design. It suggests various applications of the vernacular and how lessons from tradition can be applied to design. It will therefore be used as a foundation to test ideas through design along with elements and concepts from other theories.

¹²⁷ Ibid., p.71.

2.5 Tradition and innovation in contemporary practice

2.5.1 Introduction

This final section of the literature review establishes whether architects draw influence from tradition in their works in practice and analyses how tradition and innovation has been applied to contemporary buildings in a selection of projects. The architects referred to in the literature are selected to illustrate a range of different design approaches that lean on tradition in varying degrees and with particular focus on specific aspects. The practices include architects from around the world, but there is particular prominence of those working on projects on the edge of urban conurbations on the western fringes of Britain and Ireland. The projects discussed are those that reveal significant impact and continuation of tradition. The research demonstrates that many contemporary architects referred to both consciously and unconsciously find inspiration from traditions surrounding a place in their works. Adam Caruso states quite generally that their work is stimulated by 'things they have seen before... how buildings have been built in the past and how new constructions can achieve an equivalent formal and material presence.'¹²⁸ Caruso sees 'anything that can contribute to the fragile continuities between the contemporary situation and past architectures is worth the effort. It is only by understanding and reflecting on the past that architecture can continue to be a relevant social and artistic discipline'¹²⁹ today.

Contemporary architects in the UK and around the world have reinterpreted elements of tradition in innovative ways in contemporary practice. The following architects and designers reveal a multitude of approaches employed to reflect local culture in new design. The examples discussed are primarily not those that imitate traditions and styles; but those that more closely follow the critical regionalist schools of thought and the notions of Amos Rapoport on understanding vernacular environments as opposed to the literal reproduction of the past. Many designers have focused on specific aspects of tradition, relating to landscape and context of place, form, materials and methods of construction, function and economics and cultural aspects of tradition. Some works address a number of these themes and do so in a diverse range of ways. The themes are analysed below in relation to examples of contemporary practice.

A matrix of design projects by a broad collection of architectural practices is identified to highlight the scope and varying approaches of tradition and innovation in contemporary architecture. It displays a range of projects, from more literal applications of tradition, to more conceptual principles that are drawn from tradition and translated in design. It focuses on various elements of the vernacular.

¹²⁸ Adam Caruso, *The Feeling of Things* (Barcelona: Ediciones Poligrafa, 2008), p.25.

¹²⁹ *Ibid.*, p.25.

2.5.2 Landscape and Context

A number of architects have continued to follow the established tradition of building sensitively in the landscape through critically understanding the context within which they are working. Awareness of environmental and climatic issues is commonly addressed through passive design strategies. There is also an appreciation of the importance of realising how buildings function and adapt in the landscape both physically and through progression of human needs.

Architect David Lea explains the importance of acquiring knowledge of materials and the land as this can influence the siting of buildings. He observes the value of being able to understand the positioning of vernacular dwellings in the landscape to reinterpret the principles to inform the siting of new buildings within the environment.

He states:

the siting of a house in open countryside is not easy; it requires time to understand the climate and seasons. Who has not noticed, when travelling through a valley in shadow in the wintertime, or as the sun is setting early behind the hills, that there is one place where light still lingers, and there stands a house?... most houses in the countryside turned their backs, or at least their shoulders to the wind.¹³⁰

Similarly to Architect Dominic Stevens, learning from the vernacular is about practical principles that tradition has taught us, the simple, easy to construct buildings, made with locally available materials through passive means and relating closely to the site and context. The concept of easy is discussed by Mary Arnold-Forster from Dualchas Architects in terms of how the vernacular should be viewed for contemporary design. She describes vernacular as 'often seen as a symbol of backwardness today so where the development of ideas have been used it has to be affordable and way of living made easier as through history people have strived to make their own burden easier.'¹³¹ The notion of easy and simple appears more difficult and complex to achieve today, this idea is explored in the thesis.

Stevens describes how we can learn from the relationship of vernacular buildings to their surroundings beyond the physical boundary of the site, considering site specific factors including topography, light and climate, based on environmental sustainability.¹³² Dominic Stevens states that:

If we learn from our past and from species around us and add to this our contemporary technical no-how and our intellectual cleverness as a species we can once more make houses that are a balanced part of the landscape in which they are sited as opposed to being hosted by the landscape.¹³³

In designing his own home Dominic Stevens's commitment to his conviction of the significance of understanding the site and surrounding context, is shown through him camping out on the site to intimately learn routes, wind, shelter and views. The house is passively designed to

¹³⁰ David Lea, 'Fake or Real?', *Planet: The Welsh Internationalist*, 138, (1999/2000), 77-83 (p.78).

¹³¹ Mary Arnold-Forster, 'Highlanders Have Long Travelled' in *Architecture in Scotland 2006-2008: Building Biographies* (Glasgow: Lighthouse, 2008) pp.152-157 (p.157).

¹³² Dominic Stevens, *Rural: Open to all, beginners welcome* (Ireland: Mermaid Turbulence, 2007)

¹³³ *Ibid.*, p.32.

achieve warmth in winter through extensive glazing on the south façade allowing sunlight into the house to heat up the north side. Heat loss is avoided by super insulated walls throughout the rest of the building. Large openings to the west and the east allow cross ventilation through the house in summer. Raymund Ryan summarises Dominic Stevens work as 'evidence of an Irish Architecture capable of incorporating past and future, that takes pleasure in context, that is conscious of its environmental responsibilities, and that emphasises the essential social or communal aspects of dwelling.'¹³⁴

Glenn Murcutt in his architecture in Australia similarly aspires 'to marry modern architecture to the place, the territory, the landscape'.¹³⁵ In parallel to Stevens, his buildings possess responses to numerous climatic conditions, producing their own shade, ventilation and cooling without the need for air conditioning and simply with the addition of a fireplace to provide warmth. This is in the context of Australia, where responses to the land are very different compared to Ireland, but the underlying principles are the same and can be transferred throughout the world.

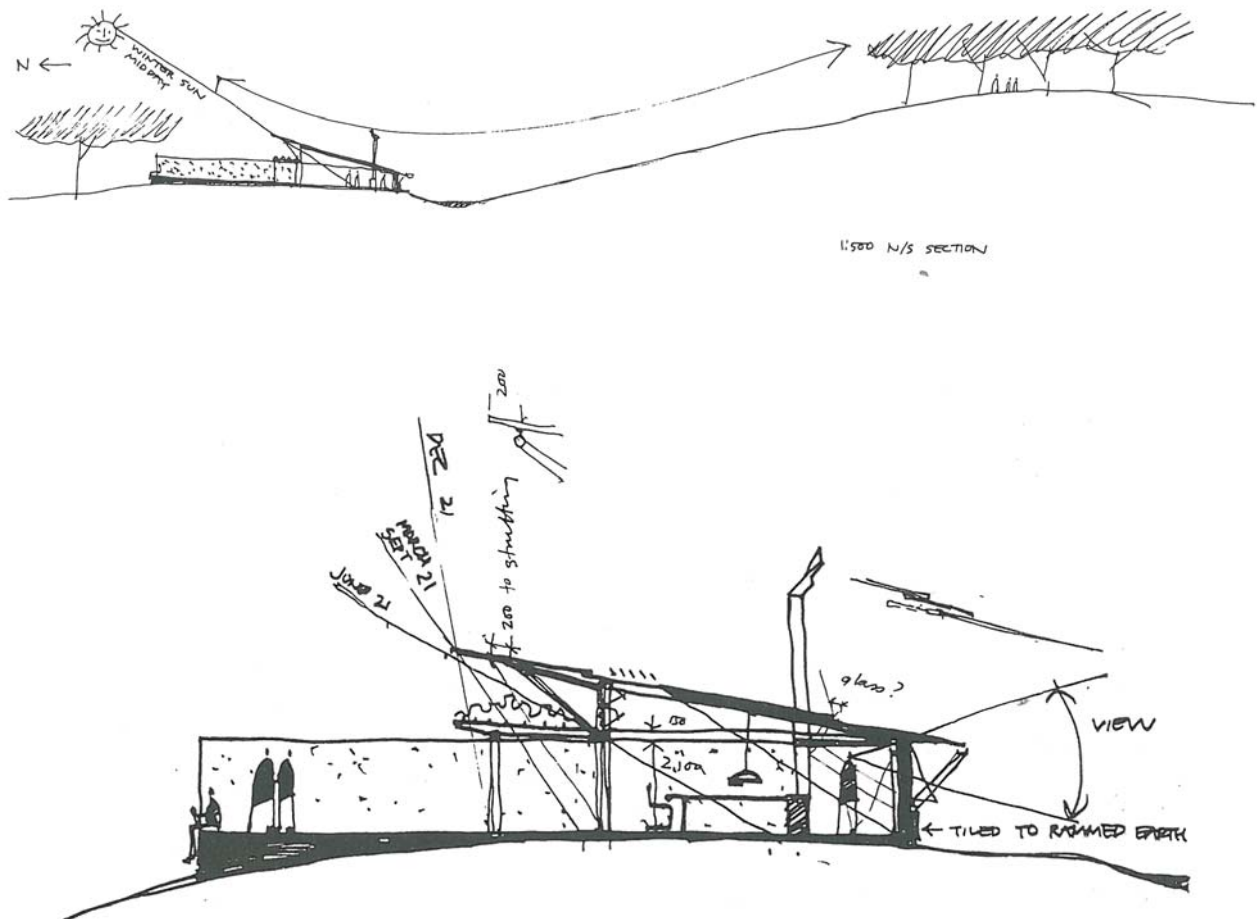


Fig. 2.6 Sketch of Meagher House, Bowral, New South Wales by Glenn Murcutt showing effects of wind and sunlight; Fig. 2.7 Sketch showing glazing on the north façade, which takes account of seasonal changes in the angle of the sun's rays

¹³⁴ Raymund Ryan, 'Living Leitrim: Dominic Stevens and an Inhabited Countryside', *Architecture Ireland* 209 (2005), 48-49 (p.49).

¹³⁵ Françoise Fromont, *Glenn Murcutt: Works and Projects* (London: Thames and Hudson, 1995), p.7.

Lacaton and Vassal in France produce subtle architecture that fits in with the surrounding context in a more literal, yet unusual way. For example their design of the House in Coutras is based on a greenhouse form and is sited amid a flat landscape, surrounded by numerous other greenhouses. It 'appears anything but shocking, it nestles in its surroundings in a kind of vernacular contextualism.'¹³⁶ As with the other architects discussed, they have shown importance of holding a deep understanding of the unique context in which they are designing, which is gathered through critical analysis of place.

2.5.3 Form

The wide ranging attitudes to form of contemporary designers is demonstrated in a broad spectrum of projects which are influenced in differing ways by tradition, from those literally copying traditional forms to those producing works to various degrees of abstraction. This is highlighted in the Matrix at the end of this section. Many of the contemporary works described draw on 'an approach that adopts the spirit of the vernacular, if not its actual forms'¹³⁷. They are not intended to create a new style, but to reflect the characteristics of local buildings, adopting similarities in some respects to context, and consciously rejecting other aspects. Analysis of a wide scope of factors from the past including landscape, scale, use of resources, construction, function and economic restraints etc. have provided a basis to shape form in many cases.

The work by John Simpson Architects at Poundbury from one end of the scale shows the imitation of local and traditional West Country architecture, through the use of new construction techniques and responding to contemporary requirements. With the intention for the aesthetic to appear old, the buildings are designed to look a certain way, rather than to respond to their surroundings as the traditional buildings they are based on would have done in their time. The thesis argues against this approach to design and supports Amos Rapoport's theory of learning through analysis as opposed to producing stylistic reproductions of the past.

Gion A. Caminada however preserves the characteristic style of the surroundings in his works in Switzerland, by developing the traditional ways of construction, but not simply imitating them. For example in his design for a school in Duvin the roof is constructed of wood and concrete, with spans of 9m and the window openings, revealing certain changes with respect to the old methods. The form fits in the context of its place, however the application of new technologies has allowed the form to fulfil the spatial needs of current requirements that old methods of construction could not permit.

Murcutt draws directly from the traditional Australian farm buildings in his works, adopting some of the materials and techniques where relevant. He rejects the notion that he is nostalgically

¹³⁶ Ilka Ruby and Andreas Ruby, *Lacaton & Vassal*, (Barcelona: Gustavo Gili, 2002), p.5.

¹³⁷ Vicky Richardson, *New Vernacular Architecture* (London: Laurence King, 2001), p.6.

bringing back old imagery but that he is adapting the architecture that is appropriate, direct, rational and beautiful in the Australian context.¹³⁸

The works of Japanese architects Terunobu Fujimori and Kengo Kuma combine vernacular forms of rectilinear plans and pitched roofs, with an unexpected use of materials in the expression of their buildings. Kengo Kuma's designs are extensively simple and they are inspired by the vernacular, but materials are applied innovatively to produce minimalist, abstract compositions.

Architect David Lea expresses that the walls, roof and openings are the basic elements of traditional buildings along with the materials they are made from, and these elements are the tradition. He describes that 'the roots of tradition do not lie in form or style they lie in construction'.¹³⁹ It is significantly out of material and technology available that form is determined, and depending on peoples' requirements at the time.

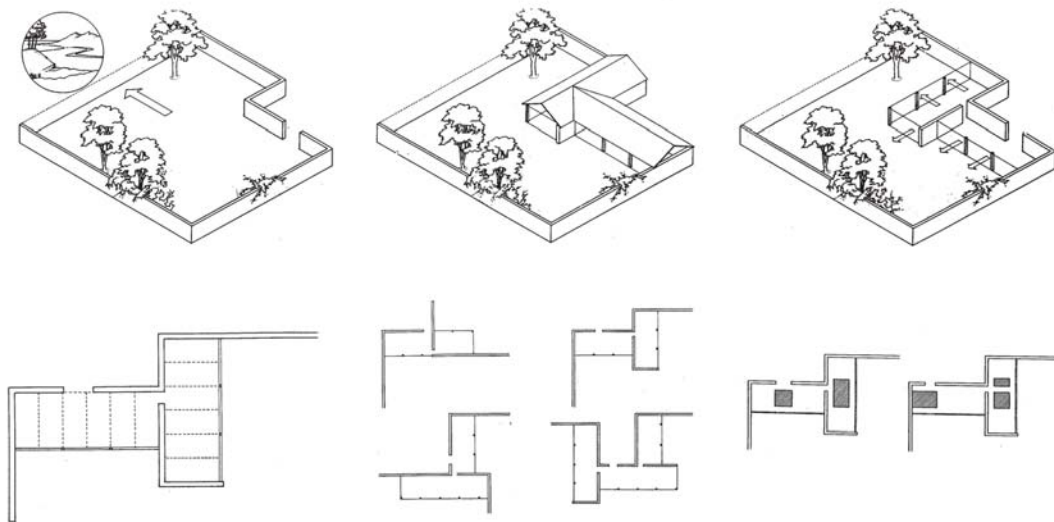


Fig. 2.8 David Lea's design approach to form: Enclosure, form, relationship between inside and outside; Fig. 2.9 Standard structured bays for simplicity and economy, arranged in wings depending on size of house and orientation, service rooms divide space

Dominic Stevens believes in a practical way, that form should be shaped through the choice and understanding of site and knowledge passed down through communities.¹⁴⁰ He argues against an objective of new buildings being in a vernacular style as he feels, 'it is a way of being'. He claims the 'vernacular tradition is not a style that you can make a pastiche of, but it is a robust, pragmatic tradition.'¹⁴¹ Designing in this way is more relevant to current times as opposed to the application of a traditional costume applied to the structure.

¹³⁸ Fromonot, pp.25-8.

¹³⁹ Lea, P.79.

¹⁴⁰ Dominic Stevens, *Rural: Open to all, beginners welcome* (Ireland: Mermaid Turbulence, 2007)

¹⁴¹ Ibid., p.66.

Lacaton and Vassal design from the interior spaces outward, allowing the form to arise from what is created internally. They consciously use constraints made by building codes, rules and regulations to inspire their design rather than hindering it.

2.5.4 Materials and methods of construction

Gion A. Caminada utilises the natural resources of a region and the local craftsmen of a place in his architecture. In a similar way Terunobu Fujimori uses organic materials in his works and local amateurs to construct his buildings. Fujimori however exploits the unique qualities of natural resources in a non-traditional way. The finish of the material is an important aspect of Fujimori's works. He attempts where possible to use raw, un-worked wood, earth and bark as in the natural state of materials used in Shinto shrines. He sees the irregular, inconsistent shape and character of natural materials as a unique quality, and strives to exploit it in his designs. He believes that engineering materials, such as steel, glass and concrete, lack these qualities¹⁴² and that when natural materials are treated they lose their symbolic origin.¹⁴³ Peter Cook identifies materials as the key focus in Fujimori's work and describes how 'nearly all his work claims to be inspired by material: its naturalness, its localness, its manner of being cut or honed or planted'.¹⁴⁴ Terunobu Fujimori's approach and philosophy to design is for his buildings to be constructed by amateur artisans where possible, as technically skilled Japanese labourers are not needed to carry out the simple tasks of splitting wood, laying the ceiling and applying plaster by hand.

Kengo Kuma uses a wide range of natural resources including wood, stone, paper, bamboo, plastered straw, dried vines and earth with sensitivity in his works, attempting to remove all traces of tradition from the forms and methods of construction and turning the materials into abstract compositions. This can be seen at Nasu History Museum. The materials are not returned to nature but maintain a certain architectural character. In parallel to exploring the uncommon use of traditional materials, Kuma investigates the application of new materials, using contemporary construction techniques with indigenous forms and styles as in Takayangi Community Centre. In it he borrows elements from the surrounding *minka* country houses and uses traditional wood and thatch, as well as high-tech synthetic post-tensioned struts.



Fig. 2.10 Nasu History Museum by Kengo Kuma; Fig. 2.11 Partitions made of vines; Fig. 2.12 Straw and aluminium mesh sliding panels

¹⁴² Arata Isozaki, Tadao Ando and Terunobu Fujimori, *The contemporary Tea House: Japan's Top Architects redefine a Tradition* (Tokyo: Kodansha International, 2007), p.80.

¹⁴³ Thomas Daniell, 'Back to Nature', *Archis*, 3 (2001), 33-34 (p.33).

¹⁴⁴ Peter Cook, 'The Person I Want to Meet', *Architectural Review*, 224.1139 (2008), 40

In parallel to traditional buildings, Dominic Stevens regards tough, plain materials able to withstand varied weather conditions should continue to be used in construction. Easily accessible local and natural materials should be utilised where possible, using local craftsmen and builders.¹⁴⁵ To Stevens, the new 'vernacular' involves the self-build of affordable homes by amateurs and by a communal effort of the local people.¹⁴⁶ Stevens has carried out his ideologies of learning from the vernacular in his own way of life. He designed and constructed his own house with assistance from his wife, students from Dublin University and local inhabitants. His preference is to work with clients who want to build their own home, whether they want to build the whole thing or simply the fitted furniture. He regards that 'building one's own house is a vernacular tradition'.¹⁴⁷ His home is built from basic, economical materials - planks of wood, plywood, and sheets of glass. 'It is built of local materials, using constructional logic that combines the modern with the vernacular.'¹⁴⁸ Stevens argues that people today have lost an understanding of the process of building, relying on others to repair it if things go wrong. He sees houses as a continual process of construction and not a commodity. This thesis explores the role of the architect in contemporary design alongside the ideas of vernacular buildings being constructed by occupants and local people and their engagement with their own dwellings.

Architect Simon Conder also does not necessarily adhere to using local resources but rather those that are available locally; he is more interested in depicting the character of a place. In a bungalow project in Dungeness, Sussex, Conder attempts to lightly represent the gradual additions and adaptations that have been made to modest fishing huts by generations of dwellers. He has done this by using materials available in local DIY stores to find a modern equivalent. The walls and roof are clad in black rubber, which is used to mimic sarking felt used on the roofs of many local buildings.

Commonly the architects referred to above have combined tradition and innovation in either their choice of materials, or in the method and application of technology. Materials are either sourced locally or purchased locally but imported from afar in the different projects discussed. This is due to different priorities and decisions made about the practicality, locality, availability, durability, sustainability and aesthetic sensibility of materials to the projects. Cost of materials significantly appears to be an influencing factor in material selection.

2.5.5 Function and Economics

Caminada states 'I do not explain my buildings in terms of complicated theoretical edifices or arbitrary artistic inspirations'¹⁴⁹; but his main interest is in the real building needs. He explains that most importantly a building should fulfil a function in a meaningful way and from there

¹⁴⁵ Dominic Stevens, *Rural: Open to all, beginners welcome* (Ireland: Mermaid Turbulence, 2007)

¹⁴⁶ *Ibid.*, p.66.

¹⁴⁷ *Ibid.*, p.99.

¹⁴⁸ *Ibid.*

¹⁴⁹ Gion Caminada, *The Architect, the Cook and Good Taste*, (Basel: Birkhäuser, 2007), p.82.

quality should come. 'A good design embodies a totality of all events and also has the capacity to tell stories... I want there to be stories, and so I build houses for eternity'.¹⁵⁰ Caminada's interventions in Vrin, Switzerland show the architect's detailed observation of the nature of the rugged mountain environment and the struggle of its inhabitants to live off the land. Farmhouses were initially scattered across the countryside, but modern farming methods have left many farm buildings abandoned. A new slaughterhouse built on the outskirts of Vrin is built almost entirely from materials that have come from the immediate vicinity, obtained at a low cost or for free. This has allowed more attention to be given to the transformation of the material and kept the wealth in Vrin both socially and economically. The roof truss in the village hall was made using wood from the valley and cut by local craftsmen.



Fig. 2.13 The slaughterhouse by Gion A. Caminada - a stone platform with a timber structure above; Fig. 2.14. Uses traditional, local materials

Stevens argues that new buildings should be cheap to build and able to be repaired and adapted easily by their occupants. He believes that these vernacular ways have been lost as people have a tendency to overlook the qualities of the familiar,¹⁵¹ for new modes of doing things, where the occupants have less control over how they live and adapt to the changes in their lives.

Similarly Lacaton and Vassal preferably build from inexpensive materials, using standard building components which can be found in hardware stores. For example they use corrugated panels of polycarbonate and aluminium or timber shuttering, as opposed to 'costly' or 'precious' materials like natural stone or hardwoods. Materials are chosen for their specific qualities and material performance rather than finding a narrative for the selection. The low cost of materials used by Lacaton and Vassal means they are able to spend more money elsewhere on the build, such as increasing the volume of spaces not only through additional rooms, but in the experiential quality of spaces.

¹⁵⁰ Ibid., p.82.

¹⁵¹ Dominic Stevens, *Rural: Open to all, beginners welcome* (Ireland: Mermaid Turbulence, 2007)



Fig. 2.15 Latapie House, Floirac by Lacaton and Vassal is low budget and fits into the street profile of a discontinuous residential area of Bordeaux's inner suburbs; Fig. 2.16 Materials used are polycarbonate and timber shuttering

Traditional buildings were practical through efficient use of space and designed for specific or shared functions to fulfil the needs of their occupiers, designed effectively but to a minimum. Buildings were also efficient in resources and materials, which can be seen to be continued in the designs of a number of contemporary architects.

2.5.6 Cultural aspects of tradition

Kengo Kuma reinterprets long-standing Japanese aesthetic sensibilities and combines them with those brought about by contemporary life and using the latest technologies. He applies the Japanese aesthetics of the interaction of light and shadow, openness and mass, nature and man-made to his designs with simplicity and directness. For example, his use of slats is reminiscent of wooden latticework, *kooshi*, and bamboo mesh and curtain, *sudare*, which are common traditional Japanese devices that mediate between inside and outside whilst providing privacy. The traditional elements of *shoji* or *fusuma*, sliding panels, are applied in the Nasu History Museum in a contemporary way, where inside glass walls, straw and aluminium mesh sliding panels are key features. The use of natural materials in the spatial arrangement of *fusuma* and the moderation of light, which the screens create, is in the traditional architectural style of *sukiya*.

In a more unusual way Fujimori integrates nature into his buildings by encouraging vegetation to grow on the exterior. In his Grass House, yellow dandelions, *tanpopo*, are grown in the joints of the stone-wall cladding. When the dandelions are not in flower other wild flowers fill the walls giving the building different appearances throughout the seasons. This approach towards aspects of the building changing through the seasons shows an awareness of the times of the year, as recognised in the native Shinto faith. The gradual weathering over time is linked with the Buddhist manner of allowing buildings to wear and be encased with nature. Fujimori's intention to allow his buildings to age gracefully shows similarities with *sabi* principles.

A number of Terunobu Fujimori's works are small tea-ceremony rooms or incorporate a tea room in a larger scheme. Fujimori has not endeavoured to reproduce a traditionally styled space used for tea ceremony in his designs. Although many of the elements of the traditional tea room are not represented, a substantial number are retained. His designs do not incorporate *mizuya* preparation areas and traditional *toko no ma* alcoves. The windows are large for viewing the surrounding scenery and creating a light interior unlike the traditionally shaded window openings without aspects to the outside. The floors are free of *tatami* mats. However as in traditional tea houses, the dimensions of Fujimori's tea rooms are modest and interiors intimate. Access into his tea-rooms is always through a *nijiriguchi*, a crawl-in entrance, to illustrate to the guest that the small space beyond is quite distant from the world outside. His tea rooms also have a *ro*, or hearth, to retain a connection with peoples' primeval origins through a smouldering fire.



Fig. 2.17 Takasugi-an by Terunobu Fujimori, high in the trees has an extreme *roji* to reach the teahouse, to allow mental disengagement from humanity

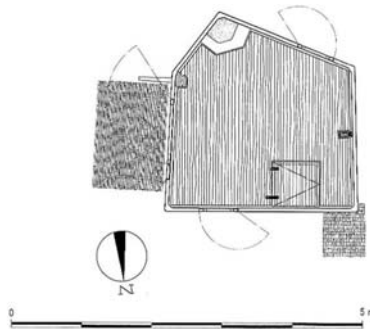


Fig. 2.18 Asymmetrical plan form; Fig. 2.19 The hearth is positioned in one corner, with the chimney above. A section of the tree trunk covered in bark protrudes through the white plastered wall.

The cultural aspects of place are reinterpreted by these architects and a number of others to a lesser degree, through abstraction of traditional elements to inform contemporary design. These include the hearth and native furniture, textures and concepts surrounding nature and the landscape.


Case studies	Image	Response to Site and Climate	Use of Materials	Technology and Construction	Sustainability	Economics	Social	Aesthetic
Architect + Project								
JOHN SIMPSON Bromswood Hall at Poundbury		Direct response to the surrounding buildings and styling of traditional west county architecture.	Traditional use of materials similar to the existing vernacular buildings in the area.	New construction techniques.				Aim for aesthetic to appear old.
NADER KHALLI Superadobe Structures, Hesperia, California, USA (1996)		Structure responds to the specific climate.	Uses crude materials available e.g. sandbags + barbed wire.	Very basic building tools used. Uses knowledge of native building techniques from around the world.			Built by unskilled local people to house war victims.	Simple primitive temporary shelters.
GION A CAMINADA Farm buildings, Vin, Switzerland (1998)		Preserves the characteristic style of the surroundings.	Uses natural resources from the region.	Traditional elements have been developed e.g. roof of wood + concrete spans 9m, larger window openings etc.		Materials obtained locally/ low cost/ free allowing more attention to be given to the transformation of the material.	It is a model of development for agricultural facilities. Uses local craftsmen.	Characteristic of the traditional building style with subtle changes that respect the old ways.
TERUNOBU FUJIMORI Takayugi-an (Tea High Tea-room), Chino, Nagano, Japan (2004)			Natural materials.	Construction techniques are handmade keeping the raw materials in their natural state but applying them in non-traditional ways.			Construction with the aid of local amateurs.	Aspects of tradition are embraced and adapted, while others are consciously dismissed. The overall aesthetic has a handmade appearance in form and textured surfaces.
DUALCHAS BUILDING DESIGN The Shed, Tokavog, Scotland (2006)		Respect to vernacular building form and expression of the past	Use of modern and natural building materials.	Modern ideas and technology used.	Highly insulated with underfloor heating.			Simple traditional form.
GUMUICHUJIAN ARCHITECTS Think tank, County Cork, Ireland (1998)		Responds to place + climate. It sits low on the horizon. Wood, stone + glass corresponds with the hills, shoreline + water. Large overhanging roof fits in with local humble cowsheds, but also practically distributes heavy rainfall away from the building.	Traditional building materials, wood, glass + steel.	Traditional materials detailed in a contemporary way.				Gumucheljan sees it as 'a found structure, a simple fineness object'.

Fig. 2.20 A matrix of contemporary design projects influenced by tradition from literal to conceptual applications








<p>ODONNELL + TUOMEY ARCHITECTS Furniture Factory, Letterfrack, County Galway, Ireland (2001)</p> 	<p>In keeping with the landscape and existing buildings.</p>	<p>Timber used throughout.</p>	<p>Timber used throughout, providing an economical form of construction.</p>	<p>Modern building that resonates at the same time with a vernacular architectural past with abstract forms and use of light and texture.</p>
<p>DAVID CHIPPERFIELD ARCHITECTS River and Rowing Museum, Henley on Thames, UK (1997)</p> 	<p>Inspired by local self-built boathouses and traditional wooden barns of Oxfordshire. Pitched roofs in vernacular style, but of stainless steel rather than slate. Raised on columns from flood plain.</p>	<p>Simplicity of materials. Indigenous English hardwood oak used in its raw state. Long parallel oak-clad forms weathered to a pale grey. E.g. detailed so steel nuts and bolts don't discolour the timber.</p>	<p>Innovative rainscreen cladding system making best use of the material with specially developed details. E.g. detailed so steel nuts and bolts don't discolour the timber.</p>	<p>Modern intervention in the landscape incorporating traditional, local building materials and techniques to reflect the qualities of the island.</p>
<p>SUTHERLAND HUSSEY ARCHITECTS Ferry Shelter, Tree, Scotland (2003)</p> 	<p>Takes inspiration from black/white buildings in the felt covered bidge. The timberwork refers to the boatbuilding industry. An old stone dike is incorporated. Protection is provided from the elements but the natural environment is embraced.</p>	<p>Natural resources of the region, and traditional building materials used.</p>	<p>Traditional building techniques.</p>	<p>Modern intervention in the landscape incorporating traditional, local building materials and techniques to reflect the qualities of the island.</p>
<p>ALVARO SIZA Boa Nova Tea House, Leca da Palmeira, Portugal (1963)</p> 	<p>Integrated into existing craggy rock formations. Irregular form acknowledges the natural setting. In harmony with the weather conditions and lides.</p>	<p>Stucco clay roof connects to local tradition but is resolutely modern.</p>	<p>Craftsman like attention to detail.</p>	<p>Low forms fit into the rocky surroundings.</p>
<p>GLEN MURCUTT Marie Short House, Kempsey, Australia (1975)</p> 	<p>Position, orientation, dimensions of house are considered in terms of the subtropical climate-heavy rainfall, north-east cool sea breeze in summer and cold westerly winds in winter. House is like clothing - can wear more or less depending on season + weather.</p>	<p>Used materials available on site + off the peg components of standard glazing. Curvilinear iron + fixed or adjustable louvers. Use of end of line timber acquired from local saw mill incorporated into the design.</p>	<p>Simple details + construction techniques familiar to local builders accustomed to working on farm buildings + foundations. Raised from flooding 'touches the earth lightly'.</p>	<p>The use of a bolted, modular structure + standard components means the house can be extended or even dismantled and moved elsewhere. It can be enlarged + rearranged to meet families changing needs.</p>
<p>SEAN GODSELL ARCHITECTS Glenburn House, Victoria, Australia</p> 	<p>Embedded in the landscape, protecting from prevailing winds and buffering the west side of the building from extreme heat in summer.</p>	<p>Environmentally sustainable design. The building skin includes solar collectors for power + hot water. Double glazing, rainwater harvesting + digital power management, make a seemingly simple house a sophisticated device for passive environmental management.</p>	<p>Environmentally sustainable design. The building skin includes solar collectors for power + hot water. Double glazing, rainwater harvesting + digital power management, make a seemingly simple house a sophisticated device for passive environmental management.</p>	<p>Long, low form fits into the surrounding landscape.</p>
<p>SERGSON BATES ARCHITECTS Centre for Applied Arts, Ruthin, Wales (2005)</p> 	<p>Rooted in context and aesthetically appropriate.</p>	<p>Considers choice of materials, way detailed, weathers and is maintained.</p>	<p>Redefines the social and cultural uses of existing places transforming local context.</p>	<p>Modern building that resonates at the same time with a vernacular architectural past with abstract forms and use of light and texture.</p>

Fig. 2.21 A matrix of contemporary design projects continued

STEPHEN ATKINSON Zachary House, Zachary, Louisiana, USA (1999)		Pitched roof and overhanging eaves: archetypal house form. Reference to South building types and traditions.	Interior + external 'dog hot' space overlap: use of materials. Doors have conjoined steel shutters + the roof soffit above the passageway is a continuation of the internal plasterboard.	Stick framing using 2 by 4 members technique. Simple so it could be self built. Detailing is reductive using reverse engineering.	'dog hot' a Southern term for an exterior passageway that cools the rooms inside removing warm air by convection, typical of traditional Southern houses.	On a budget.	Built by clients.	Simplicity and rawness of local opicultural buildings. It doesn't replicate these buildings, but adopts their distinct qualities.
REIACH AND HALL ARCHITECTS The Pier Arts Centre, Stonnness, Orkney (2007)		Project develops a topographical response.	The roof + walls are black. The south elevation + roof have a zinc sheathing and the north side becomes pronounced with vertical aluminium bars with glass infill.	All trace of tradition is eliminated from the stone and turned into abstract compositions. The material is stretched to its structural limit using modern technology and testing.				The refurbishment of the two floor harbour building has an intimate domestic feel and of that of a cottage on the first floor. In contrast the new building is rather sleek but similar in form to the surrounding pitched roof buildings.
KENGO KUMA Stone Museum, Nosu, Tochihi Prefecture, Japan (2000)		Uses stone from the area and incorporates existing storage barns with the new structures in a subtle way.	Uses natural stone from the area.					
CARUSO ST JOHN ARCHITECTS New Art Gallery, Worsal, England (2000)		Fits in with the austere, tough fabric of the city. Inspired by industrial warehouses + factories and also Worsal's Victorian town hall. New open interpretation of context.	Cloth in terracotta tiles so to last for years without fading. Natural sand colour, smooth and reflective similar to regional brick stock.	Simple volume but structurally complex e.g. cantilevered entrance.			Drews on analogy with a house, its range of scale and feelings from intimacy of the bedroom to the grandeur of living spaces.	Connects with the surroundings in a subtle way and doesn't directly draw on tradition.
DOMINIC STEVENS ARCHITECTS Self Built Home, County Leitrim, Ireland		Site and context thoroughly explored including routes, wind, shelter and views.	Use easily accessible basic building materials. Eg. plinths of wood, plywood and sheets of glass.	Simple construction techniques in a standardised grid.	Passive heating and cooling through extensive glazing on the south facade and super insulated walls. Large openings on the east and west facade for cross ventilation.	Built simply and cheaply using economical standard materials.	Building constructed by local amateurs.	
SIMON CONDER ARCHITECTS Kent Beach House 1, Dungeness, Sussex, England		Responds to and develops the tradition of improvisation and making-do. In the extensions to Isherham's huts of the 1930s.	Doesn't necessarily use local materials in trying to capture character of place. He uses black rubber to clad walls and roof reflecting felt + tar found on existing buildings + plywood for the interior. He finds a modern equivalent of vernacular by using materials you can buy in B & Q.			Inexperience materials you can buy from local hardware stores.		
LACATION + VASSAL ARCHITECTS Houses, Bordeaux, France (1999)		Fits in with the surrounding context.	Uses standardised building components from hardware stores. Eg. conjoined panels of polycarbonate + aluminium or timber shuffling.	Standard construction techniques.		Inexpensive pre-manufactured materials allows Lacaton and Vassal to spend more money elsewhere on the project.		

Fig. 2.22 A matrix of contemporary design projects continued

2.5.7 Summary

It can be seen that architects have and continue to practice an integration of tradition and innovation in their designs in a multitude of ways, from more literal versions of tradition to very abstracted translations, where principles of vernacular have been adopted and applied to modern design. The literature highlights that tradition can be 'learned' from experience and through really understanding a place as with architect David Lea. While for other architects such as Gion Caminada, knowledge of tradition is 'developed' from personal experience and from childhood. For others, tradition is 'abstracted' through materials, technology and form, as with Kengo Kuma. The architects and practices discussed have applied varying types and degrees of innovation to existing traditions.

Architects have found inspiration from a wide range of aspects of tradition involving landscape, materials and making, practicalities and basic human needs, and have made them appropriate to their specific contemporary setting. The matrix emphasises how the selected case studies all commonly show a connection and response to the site and climate of the settings of the projects. Choice and use of materials are also critical to design. This is whether through continuing methods from the past and involving innovative applications of traditionally used natural resources, or alternatively establishing the use of new easily obtainable materials. The matrix reveals less influence from social factors than the physical, which may be as these are not discussed as much in literature or that issues surrounding social aspects of design are not as significant. The review of literature discussing cultural aspects of tradition primarily analyses the works of Japanese architects Kengo Kuma and Terunobu Fujimori. This is as there is little evidence of inspiration sought from cultural aspects of tradition by architects studied elsewhere in the world as strongly and in such great detail as demonstrated by these Japanese architects. The matrix therefore draws out diverse but relevant ways of designing, concentrated specifically on certain aspects of tradition and that hold strong design principles.

2.6 Findings

The literature review demonstrates that there is value in the application of tradition and innovation in architecture, as an approach to design that holds on to knowledge passed down generations over time. Tradition can be re-appropriated to be made suitable for our time, to retain a connection to a specific locality. In the literature it is acknowledged that the reason for doing this is because it achieves architecture that is rooted to context which gives greater meaning to place. It is emphasised that the two seemingly opposite concepts of tradition and innovation are in fact closely associated and rely on each other, as well as a degree of creativity. The two terms are progressive and build on established knowledge and experience in most applications of the concepts. The literature stresses how innovations can be just as innovative if they involve slight modifications and changes of the existing, rather than innovations consisting of completely new ideas. It highlights how innovations can occur in products, processes and in social dimensions. This helps justify the relevancy of the approach taken in this thesis to design innovatively from tradition.

The review of literature on traditions of the Welsh house confirms that there is sufficient research and primary examples of vernacular traditions to provide a basis to carry out further research and test the model. However it establishes that documented research on the vernacular in Wales is predominately narrow. Housing types are primarily categorised in relation to building form and specific architectural features, within a particular locality and including reference to materials and construction. There is a lack of exploration into how dwellings functioned and were inhabited, and cultural and social aspects of tradition involving people. These elements of tradition are considered crucial according to Rapoport in his model system based on the vernacular and therefore require further research. The literature identifies differences in regions with commonalities of building types in specific areas, highlighting the necessity to study specifics of place to maintain identity and distinctiveness.

The review of literature on architectural theorists' notions of learning from the vernacular suggests there is value and practical application in employing tradition in contemporary design. The theorists promote the idea of architects consciously employing knowledge from tradition. Amos Rapoport advocates the use of the vernacular as a model for design through analysis of environments to draw out concepts and principles for contemporary design. A number of the ideas behind this theory are shared by critical regionalist schools of thought and integral theory in architecture. Rapoport's approach appears to provide a strong framework to apply to the study.

The section comparing contemporary architects' adoption of tradition in design recognises a number of critically acclaimed architects practise using some of the principles illustrated by architectural theorists commenting on the subject. However the principles employed by architects are applied much more unconsciously than the methods suggested by the theorists discussed in the literature review. The contemporary architects show how principles from the

vernacular can be 'learned' through experience, 'developed' from personal familiarity and 'abstracted' in design. Architectural practices are diverse and embrace different aspects and interpretations of tradition. However the majority of architects practicing in their own particular locality have gained an in depth knowledge of the region in which they work, including architects David Lea, Gion Caminada and Glen Murcutt. This raises questions as to how a young practitioner or one who does not have the local knowledge of the place in which they are working can take lessons from the vernacular to inform design. Sources from the literature review state this is so essential to design, but overlook how this can be achieved. The theories of critical regionalism, Amos Rapoport's model and integral theory offer a useful foundation and starting point. Rapoport's model most explicitly describes a method to adopt for design, but similarly to the other theorists' commentary, doesn't directly offer a framework for design that can be implemented by architects. It would therefore be relevant to adopt Amos Rapoport's model as a starting point from which to test the model and refine and develop it so it can be made more accessible for use by architects and designers.

3.0 Research Methodology

3.1 Introduction

The literature review focused on the idea of integration of tradition and innovation in design. It involved an analysis of the expressions tradition and innovation, both separately and together to determine their use and meaning for design. It examined existing literature on tradition in Wales to establish whether the resources available provide sufficient evidence to go about the study and whether tradition remains relevant for contemporary design. The review of literature then summarised architectural theorists' ideas on learning from tradition to question the reasoning and value of this approach to design and the theoretical methods of how it can be implemented. Amos Rapoport's model system for design utilising the vernacular is described alongside other theorists' approaches. The review then considers how an approach to design employing tradition and innovation has been developed in practice by contemporary architects and how the application of this means of designing compares to theorists viewpoints.

It is established in the literature review that in applying tradition and innovation to design, by utilising knowledge generated in particular localities over time and making it appropriate for contemporary ways of living, an architecture that is responsive to site, place and possibly region may emerge. The literature stresses the importance of continually building on tradition through innovations in design so new buildings remain relevant to their time and do not become nostalgic reinterpretations of the past. A number of architectural theorists and architects have commented on how lessons may be learnt from the vernacular through various means in contemporary design. Commonly, they articulate that this is not to literally reproduce the past which has little to do with the present, but that tradition should be studied and analysed in its constantly changing state. It is emphasised that tradition should not be considered an object or artefact, but in relation to its cultural and physical setting. It is argued that the reason for doing this is to maintain the regional character of a place and for buildings to be appropriate to their time and setting.

The literature shows contemporary architects have implemented these ideas in diverse ways in practice, often instinctively through experience of tradition learned or developed over time. The literature raises questions as to how a designer without knowledge of a place can integrate and build on tradition in contemporary practice. As discussed in the literature review, Amos Rapoport suggests this can be done through using the vernacular as a model system for contemporary design, by uncovering and implementing specific features or attitudes of tradition as opposed to a style and applying them to design. This is in order to retain specific qualities of place, without simply copying formal aesthetics in new design, but through carrying out an analysis of tradition to inform design.

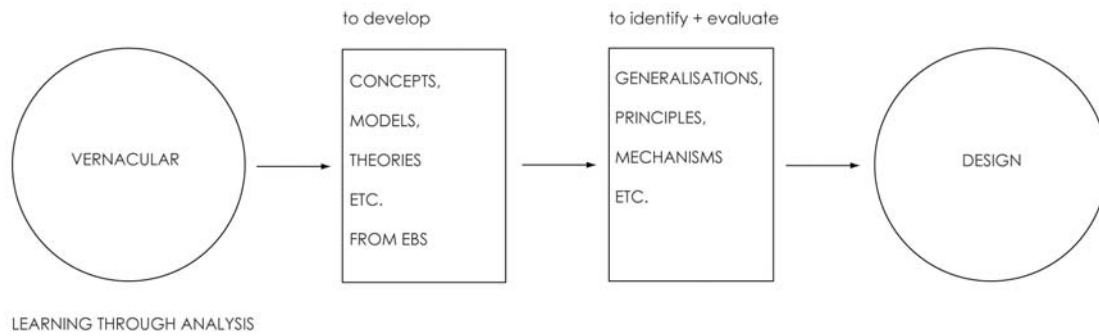


Fig. 3.1 Rapoport's model of learning from the vernacular through analysis

The literature review proves that Rapoport's model has the potential for further exploration using his framework as a theoretical foundation. The thesis therefore sets out to test Rapoport's model as a basis for the research through literature and contextual study, applied by design.

In order to test Rapoport's model as an effective tool for design of the contemporary house, the literature identifies the vernacular in Wales as a suitable context in which to test the model. This is due to the accessibility and wealth of literature and surviving examples of vernacular houses in Wales. The distinct landscape, regional differences and housing types provide a strong basis for exploring traditions specific to places within Wales. However a lack of literature on cultural aspects of dwelling is identified. The majority of research concentrates on architectural form, materials, construction and detailing, in relation to the regions in which they are located. Rapoport's model identifies that the social aspects of tradition are critical to the model, despite being less obvious in contemporary architects' case study examples. Further research in this aspect of tradition therefore needs to be addressed.

The model will therefore be implemented and tested in Wales, but with the intention that it may be employed by architects and designers in other parts of the world, in helping to design houses of local distinctiveness and character.

3.2 Hypothesis

That a 'model system' proposed by Rapoport may be developed as an effective tool in the design of the contemporary house

3.3 Aims and objectives

The primary aim is to test Amos Rapoport's theory of 'vernacular design as a model system', through research by design, to develop and refine a model for contemporary design.

Within this primary aim there are a number of key objectives including:

- To apply and test Amos Rapoport's model system in the context of the literature review
- To analyse, refine and articulate the model through design
- To develop and demonstrate methods in which designers can conduct research by design
- To test and establish a robust and legible way to design through applied studies
- To produce a number of designs based on the model as it develops

3.4 Scope and limitations

It is established that Rapoport's model will be applied and tested in the context of Wales. However information on the Welsh vernacular is widespread, so focus will therefore be concentrated on housing typologies and particularly the farmhouse and cottage types, described by Eurwyn Wiliam¹ and Iorwerth Peate² as the quintessentially Welsh vernacular. The study will also analyse the terrace as its initial forms derived from farmhouse traditions. The scope of research in this area is still great, so the three foundation studies will concentrate specifically on the longhouse, live work aspects of the cottage and early industrial workers' housing. These housing types were chosen as parallels could be drawn from aspects of tradition that could be applied with relevancy to design today. The final design incorporates ideas from these studies in a settlement group.

Specific buildings selected to be investigated are primarily chosen for convenience of access and where there is sufficient information to aid in the study. Where a lack of existing research in specific aspects of a building is highlighted, a thorough personal observation and critique will be made including detailed recording and measured survey work.

Issues surrounding identification, importance and meaning of traditions and their possible inclusion within modern practice are extensive and complex. This thesis does not intend to deal with all these issues and ideas, or provide definitive solutions and conclusions, but it aims to suggest potential opportunities and approaches that could be appropriate for design of the contemporary house.

¹ Eurwyn Wiliam, *The Historical Farm Buildings of Wales* (Edinburgh: John Donald, 1986), p.16. and p.36.

² Iorwerth C. Peate, *The Welsh House: A Study in Folk Culture* (Burnham on Sea: Llanerch Press, 2004), p.3.

3.5 Methodology

The study will involve a combination of different research approaches to fully test the model and fulfil the aims and objectives. In order to carry out the research thoroughly and with the focus being on design, the study will principally be implemented through research by design. Research by design has been widely discussed using differing terminology as highlighted below. For the purpose of this thesis the term 'practice-based research' and 'design-orientated research' provide comparable descriptions of how the exploration will be put into practice in this thesis.

'Practice-based research' is described by Linda Candy in *Practice Based Research: A Guide*. The report written for researchers involved in a wide range of the arts at the University of Technology, Sydney (2006) defines the process as:

Practice-based Research is an original investigation undertaken in order to gain new knowledge partly by means of practice and the outcomes of that practice. In a doctoral thesis, claims of originality and contribution to knowledge may be demonstrated through creative outcomes in the forms of designs, music, digital media, performances and exhibitions. Whilst the significance and context of the claims are described in words, a full understanding can only be obtained with direct reference to the outcomes.³

Focused on design in particular, Daniel Fallman's description of the process of design-orientated research more specifically relates to this thesis as there is a greater emphasis on the progression and development over the designed outcome. He describes:

In design-oriented research, the knowledge that comes from studying the designed artefact in use or from the process of bringing the product into being should be seen as the main contribution – the 'result' – while the artefact that has been developed becomes more of a means than an end.⁴

The thesis will follow this design methodology as the progression is more significant to the research than the outcomes of the designs. The final piece also may not encompass all the findings of the research as they will be develop throughout the study.

The research by design will be conducted to test how the vernacular can effectively be applied as a model system for design. It will primarily involve a literature and contextual study of both traditional and contemporary case studies. This will entail a mixed method research approach, identified by Groat and Wang, involving historical/interpretive research, qualitative research and case study method.⁵ Observations will be analysed to identify principles and generalisations that could then be translated and applied to design studies. Concepts and ideas are applied and tested in design studies through diagrams, sketches, drawings, and model making. The outcomes of design are supported by literature and case studies.

³ Linda Candy, *Practice Based Research: A Guide* (Sydney: University of Technology, 2006), p.1.

⁴ Daniel Fallman, 'Why Research-Orientated Design Isn't Design-Orientated Research' in proceedings of Nordes 2005 – In the making (Royal Danish Academy of Fine Arts, School of Architecture, 2005) <<http://www.nordes.org/opj/index.php/n13/article/view/222/205>> [accessed 24 May 2013] (p.3).

⁵ Linda Groat and David Wang, *Architectural Research Methods* (New York: John Wiley & Sons, 2002), p.362.

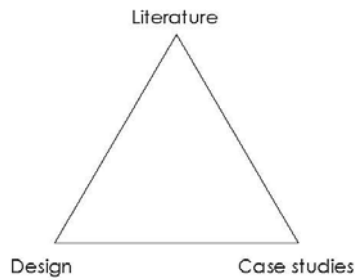


Fig. 3.2 Literature, case study precedent and design will be developed together to inform the research

Design and research will be used to inform each other through a process of 'reflection-in-action' and 'reflection-on-action' as identified by Donald Schön in *The Reflective Practitioner*. He defines 'Reflection-in-action' as the ongoing appraisal of work as it progresses,⁶ which in the design studies will involve the interaction between different research approaches including reading, questioning and making. Once each design is complete they will be analysed through reflection-on-action, which is the final reflections on experiences and the design after the process is complete, which informs the lessons learnt.⁷

The outcomes of each study will be used to inform the next in a progressive sequence and series of iterations. The model will be assessed and redefined where necessary to inform the subsequent study and then the model will be tested again.

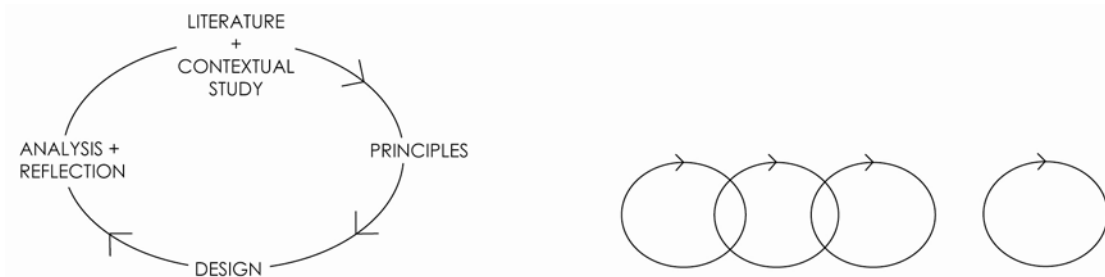


Fig.3.3 Process in which each design study will be carried out, which will in turn inform the next design study

The research is separated into four stages in the diagram above. These will comprise an initial literature and contextual study followed by identification of principles, which will then be used to inform design. Designs will be reviewed, reflected upon and then analysed. The primary phases of the research will generally happen in this way but may overlap one another or occur at the same time. They may not necessarily happen in such an ordered and progressive sequence. A more detailed description of the research stages is explained in detail below.

⁶ Donald Schön, *The Reflective Practitioner: How Professionals Think in Action* (Avebury: Ashgate Publishing Limited, 1991)

⁷ Ibid.

3.5.1 Literature and contextual study

With a view to test Amos Rapoport's concepts in the design of contemporary dwellings, thorough investigations into traditional housing typologies will be made. The research will utilise and further the studies of many architectural historians, who have primarily followed a scientific approach to study, of systematically documenting building form and features, without applying the knowledge to the cultural context in which they belong.

The building studies will consider why traditional dwellings were built as they were, and how and for what reason they have changed over time, together with the affects of economic and social changes. Investigations will specifically focus on the evolution of the vernacular as it is valuable to observe and understand the pragmatic decisions and responses made and formed through a continuous process of reflection and action to a wide range of situations and circumstances that occurred over time. The research will draw on aspects of cultural landscapes that dwellings are a part of, including people, who are often studied apart from the dwellings they inhabited. The study of vernacular environments will therefore not be exclusively restricted to the physical. In parallel with Rapoport's ideologies, it is discussed in *Culture, Meaning, Architecture: Critical reflections on the work of Amos Rapoport* that 'one's experience needs to be understood as being shaped and influenced not only by the physical system of settings..., but also by the whole range of cultural phenomena with which the person transacts'.⁸ It is also recognised that people are the most defining characteristics of environments.⁹

In the first instance, a matrix of different characteristics of tradition is drawn up to categorise principle factors affecting the form of traditional dwellings from the research identified in the literature review. Different aspects of the matrix may be studied to differing degrees, depending on particular influences surrounding the different housing types and specific buildings examined. The matrix will be used to direct the literature and contextual studies and to help inform the principles determined.

⁸ Keith Diaz Moore, *Culture, Meaning, Architecture: Critical Reflections on the Work of Amos Rapoport* (Aldershot: Ashgate Publishing Ltd., 2000), p.13.

⁹ *Ibid.*, p.12.

PHYSICAL	CONSTRUCTION	FORM	HUMAN	FUNCTION
LOCATION	RESOURCES	SIMPLICITY	COMMUNITY	ECONOMY
SITING	TECHNOLOGY	IDENTITY	PRIVACY	SPATIAL ARRANGEMENT
CLIMATE	CRAFTSMANSHIP	ARTICULATED	RELIGIOUS/ SPIRITUAL BELIEFS	FLEXIBILITY
ORIENTATION			STATUS	SECURITY

Fig. 3.4 Matrix of characteristics of tradition determined from the literature review and to be used as an operational framework to inform the design studies

The studies will primarily be based on literature referring to the Welsh vernacular, but the process will be transferable to other vernacular environments around the world. Significantly Iorweth Peate's *The Welsh House: A Study in Folk Culture* (1940) and *Houses of the Welsh Countryside* (1975, revised version 1988) by Eurwyn Wiliam, as well as archives held by RCAHMW will be used as reference. The existing literature will be studied further in greater depth through personal observation, from whole cultural landscapes, buildings and neighbourhoods, small rooms and spaces to specific details. This will be carried out through measured survey work, mapping, sketches, detailed studies, site notation and photographs. Comparisons will be made with parallel buildings types where greater information is available, to gain a better understanding of traditional environments referred to. The studies will be carried out with the aim to enhance the existing knowledge and give it a focus towards contemporary architecture.

The buildings researched are regarded as prime examples and have largely been restored and exhibited as museum pieces such as those at St Fagans National History Museum or protected by organisations such as the National Trust. Using buildings that have been renovated through these institutions will allow access to be possible and give an insight into how the dwellings were inhabited during particular eras of the past. Where possible dwellings will be studied which remain inhabited today to show the evolution of occupation up until the present.

Alongside the study of vernacular dwellings, contemporary architects' approaches to applying principles from tradition to new design will be explored through case study examples predominantly found in the UK. This is so that realistic comparisons can be made, relating to

procedures and regulations in the context of Wales. The case studies can then be critically compared against one another and will be used to demonstrate various ways in which the vernacular has been translated into contemporary design. The information will be collated from published material, including journals and books, and also from architects' websites. This will be in the form of data, drawings, details, photographs and commentaries. Case study buildings will be visited and analysed through personal observation where necessary and possible, and architects interviewed.

3.5.2 Principles

Once a wide and in depth understanding of tradition, specific to the context of the studies is attained, the next stage in Rapoport's model is to draw out principles and generalisations from the analysis of tradition. Rapoport recognises 'the value of constraints to establish generalised, loose frameworks where interplay of the constant and the changeable aspects of man can find expression'¹⁰. Constraints formed through principles, therefore help to design places which hold meaning relating to their surrounding context. Rapoport argues that buildings today tend to show 'great variety because of the relatively low criticality of building... because physical criticality is low, socio-cultural factors can operate, purely physical forces can not determine form.'¹¹ This crucial point made by Rapoport emphasises the degree of choice available in design today and how this allows the opportunity for principles relating to human factors to be applied to design, over predominantly physical factors influencing form. Literature and contemporary precedent generally appear to show little acknowledgement of socio-cultural factors and concentrate primarily on the physical, based on environmental issues, use of local techniques and materials, as opposed to significance placed on cultural and human concerns. This issue is important to the enquiry and the design methodology will therefore endeavour to define a reasonable scope of variation in chosen principles, including social matters. It would be inadequate to draw out one commonly held principle, as vernacular buildings are formed from multiple values and issues and not one single concept. The principles will also not be arbitrarily adopted.

With a view to deciding what key principles should be taken from the vernacular, Lang proposes that 'simply, the attitude towards what is important and what is not shapes designs'.¹² This ideology is at the root of vernacular design and therefore it would be appropriate to take this philosophy as a model for contemporary design. Charles Eames similarly expressed that, 'constraints were the key to the design ... If constraints were the shaping forces of the design process, then the guiding force was something called need'¹³. As a method to select relevant principles from tradition, a hierarchy of needs is established for each housing typology, based on Maslow's hierarchy of needs, which is represented in a pyramid shape. As identified in the

¹⁰ Amos Rapoport, *House, Form and Culture* (Englewood Cliffs NJ: Prentice-Hall, 1969), p.59.

¹¹ *Ibid.*, p.59.

¹² Jon Lang, 'The "New" Functionalism and Architectural Theory' in *Culture, Meaning, Architecture: Critical Reflections on the Work of Amos Rapoport*, ed. by Keith Diaz Moore (Aldershot: Ashgate Publishing Ltd., 2000), p.95.

¹³ Eames Demetrios, *An Eames Primer* (London: Thames and Hudson, 2001), p.168.

literature review, there was a degree of choice surrounding the vernacular, and decisions were not simply objective but also subjective.

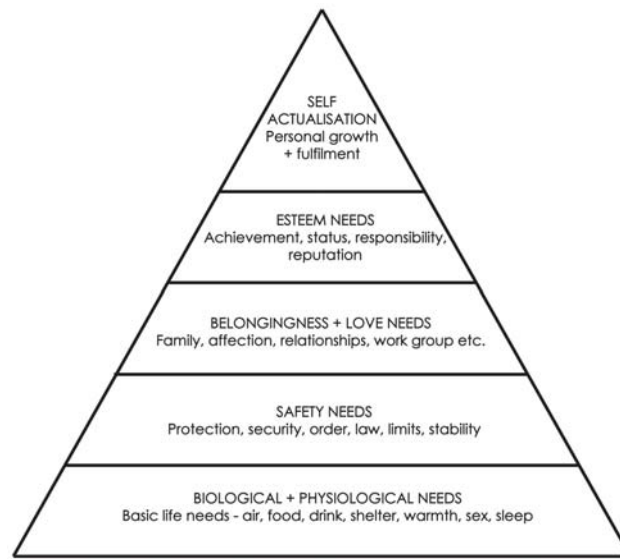


Fig. 3.5 Maslow's hierarchy of needs

In Maslow's ranking of human needs the largest and most basic needs are shown at the base of the triangle, with needs such as belongingness, love, respect and self-esteem further up the triangle and finally the need for 'self actualisation' at the top. Maslow maintained that all healthy human beings, once they have fulfilled their basic needs move inevitably towards to the highest ranking of needs if culturally possible. He defines self-actualization as 'ongoing actualization of potentials, capacities and talents, as fulfilment of mission'.¹⁴ In order to reach this level, Maslow states that this can only be achieved once the lower needs are satisfied.

Maslow's hierarchy of needs has since been analysed and discussed in a range of different fields including housing and design. It is referenced in *Tradition and Sustainability*, where it is urged that the base levels of the hierarchy are critical to design. It states, 'we must be able to provide houses that meet the basic physiological and safety needs: a dry, warm, and safe place in which to live. Simultaneously, we need to provide urban areas where communities can be re-established so as to meet social needs.'¹⁵ It is therefore argued that meeting the user's needs, both physically and socially is essential in housing delivery.

A triangle of needs will be determined and adopted to inform the design process in this thesis in a comparable way to Maslow's hierarchy of needs. However it will display the most fundamental factors in shaping vernacular dwellings at the base of the triangle and less critical matters influencing form towards the top, associated with wants and desires. This

¹⁴ Abraham H. Maslow, *Toward a Psychology of Being* (New York: Van Nostrand Reinhold, 1968), p.31.

¹⁵ Tim Yates, 'Sustainable Refurbishment: A key Component of the Built Heritage' in *Tradition and Sustainability*, ed. by The Prince's Foundation for the Built Environment (London: Compendium Publishing Ltd., 2010), pp. 112-125 (p.116).

interpretation and method of extracting principles from research in literature and from contextual studies will be tried and tested firstly in a pilot study and then refined for the following foundation studies. This will illustrate the principle influences affecting the building typologies.

Using a colour coding system, the principles from the triangle will be correlated back to the matrix of factors relating to tradition to highlight the relation between the categorised principles in the matrix and their significance in the hierarchy. This method will then be used to suggest the key influences on the form of different dwelling types and shape the principles adopted from tradition to inform contemporary design studies.

3.5.3 Design

The above research will methodically set out principles that can help inform the design process in a series of foundation studies of different housing types. The design studies will use potential sites that are ready for development and test ideas in the design of schemes that are applicable to housing requirements, based on current standards, regulation and good practice.

The design briefs will be developed from knowledge accumulated from the literature, case study examples and from professional expertise. Where possible, experts from various backgrounds and with appropriate experience will act as clients for the design studies. The briefs will be carefully considered to suit the dwelling types studied. The location of sites and the actuality of programmes will be considered in relation to their relevance in the contemporary. The briefs will be kept open, setting out key accommodation, but leaving many questions to be answered and explored through the process. Lawson describes that an 'attempt to define the problem too clearly or in too much detail can sometimes constrain the design process and send it down a blind alley.'¹⁶ He explains that it is the knowledge gained in the process or expertise of the designer that is the key to solving design problems and helps to arrive at a solution, through the ideas of solving them.¹⁷ The design studies will concentrate on the process and the development towards the design outcome as defined in 'design-orientated research' by Daniel Fallman.

Initially a pilot study will be carried out to test the methods for the research, prior to embarking on the main studies and to establish a framework. The pilot study will be used to test the 'model' as an entity in its constituent parts and also the processes of the research including literature and contextual study, extraction of principles, design and review. The pilot study will be used to determine whether the proposed methods of study are appropriate and realistic to conduct in the timeframe and with the resources available. It will also be implemented to identify any potential issues in the model, which will be reassessed for the following studies.

¹⁶ Bryan Lawson, 'The Art of the Process' in *The Art of the Process: Architectural Design in Practice*, ed. by Louise Rogers (London: RIBA, 1993), p.8.

¹⁷ Ibid., p.8.

The pilot study will be followed by two additional design studies of different housing typologies, which will form the foundations studies. The model will be assessed and redefined for a final design study which will comprise knowledge accumulated from the previous foundation studies.

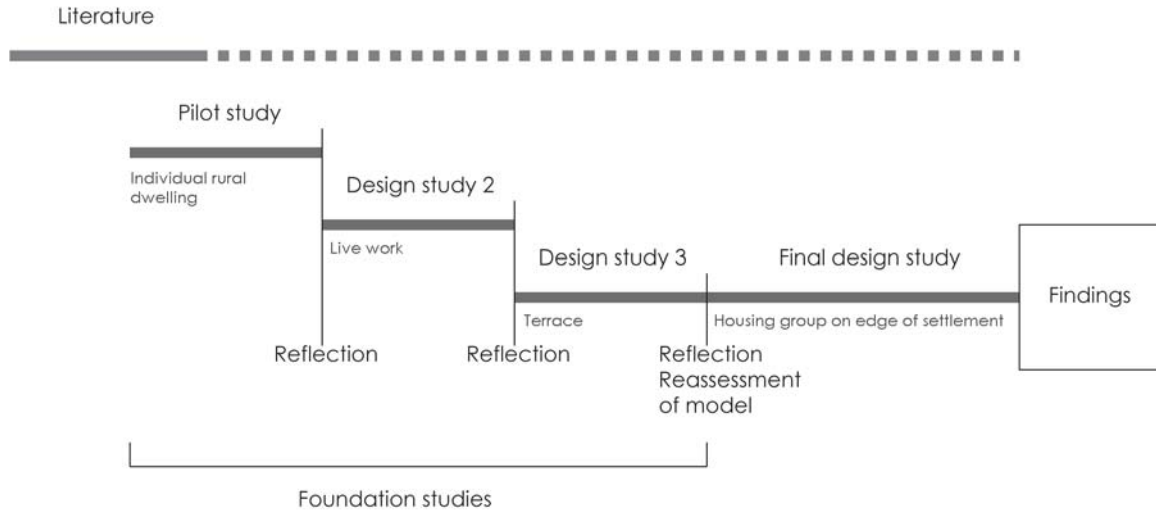


Fig. 3.6 Method of 'research by design' undertaken in this thesis

The structure of design studies is as follows:

Pilot Study	The individual dwelling – Rural] Foundation studies
	Live work – Urban	
	Terrace – Edge of settlement	
Final Study	Housing group – Edge of settlement	

(Note: these typologies and studies evolved in the research process and were not predetermined from the outset)

The initial pilot study is of the individual rural house in which the Welsh longhouse is defined as the traditional typology in which the study is based. The longhouse is identified as a relevant house type to study as it is a prime example of the traditional Welsh house, often described as the 'quintessentially Welsh upland house'.¹⁸ It is also a type which existed across other regions in Europe and can therefore be related to other vernacular environments. The longhouse was a common solution, built to meet the needs of the local people and embodies many typical vernacular traditions of Wales. There is a relevancy to study the individual rural house for contemporary design in order to address the demand for affordable rural housing in Wales.

¹⁸ Peoples Collection Wales <<http://www.peoplescollectionwales.co.uk/Item/35765>> [accessed 10 February 2012]

The next foundation study focuses on live work as a typology which is increasingly relevant to contemporary ways of living with literature proposing that there is a current need for development of this typology. Traditionally the majority of vernacular homes in Wales contained some type of work related activity, particularly in the cottage form, where craft industries developed. This study therefore draws on the cottage typology in its various forms from the one-roomed cottage with its assorted additions to purpose built weavers' cottages, where structures were built specifically to house living and working under one roof and where functions are clearly defined.

The following foundation study addresses the terrace as a typology which has been recognised as maintaining relevancy to contemporary living. It can also provide a suitable resolution to housing requirements. The terrace has commonly been re-appropriated by a number of architects and practitioners in recent times, demonstrating its significance for today. Early industrial workers' terraces in Wales embody a range of vernacular traditions and offer an example of housing where community and social aspects of living are important.

The final study focuses on the design of a group of dwellings on the edge of a rural settlement as a response to current housing need and density in rural areas. Rather than drawing on a particular typology from tradition this study takes principles from the longhouse, cottage and terrace traditions in the context of the site and brief.

The literature review and contextual studies will be used to aid the design process in varied forms from a conceptual level to more detailed and specific issues of design. This will be gained from both a traditional and contemporary perspective. The principles set in place from the literature review will be used as a tool to enable exploratory thoughts to emerge. Principles may be expressed visually, be part of the building process or be adopted in a more abstract and conceptual way.

The design process will not be separate from the initial research and will involve further detailed investigation and exploration throughout the design process, having equal significance in influencing one another. Research and design will be encouraged to evolve alongside one another and may happen in a non-linear way. Continuous analysis and reflection will be required to inform ideas and to develop the design through 'reflection-in-action'.

The research by design will be carried out through explorations and investigations, represented through the medium of diagrams, sketches, drawings and model making. Detailed studies will provide an opportunity to evaluate and modify design concepts using research gathered. The designs will be developed using information, knowledge and available resources that provide documented evidence to give a valuable basis for decision making in design. Alongside this the designers' own observations and subjective responses are critical. The designs will also be

questioned and interrogated by a range of professionals and experts. Their viewpoints and approaches will be considered and incorporated into the designs where appropriate.

The design process will therefore involve predominately qualitative research through personal observation and the input from others through design reviews, critiques and interviews. The advantages of this method are that it will enable the designer to gain a holistic and insightful view of the situation and work in a flexible way that can adapt and change during the process.¹⁹ However qualitative research has less established guidelines of how it should be followed and the credibility of qualitative data is also more likely to be questioned so needs backing from various sources or through peer review.²⁰ Some issues will need to be addressed through quantitative research, as there are given standards that will have to be achieved. These will be sought through personal surveying and already built and tested studies by others. Even though quantitative research is more concrete, it still will involve a certain degree of judgement and representation.

The role of the architect and the occupier will be considered in relationship to how design and construction has changed from vernacular examples, where occupiers were involved in the creation of their homes. The nature of the studies that set out to design affordable dwellings, consequently do not allow inhabitants the same degree of control on the design of the places in which they live because they are predetermined without the occupiers involvement. The designs will therefore consider how professional designers can recognise the occupiers influence in the design outcomes and how they can become involved when design is premeditated rather than worked out on site.

The knowledge gained in each design process and the effectiveness of the process itself in developing an outcome will be used to aid in the subsequent designs as progressive studies.

3.5.4 Review, analysis and reflection

The designs will then be critically analysed and reflected upon. The analysis will form an important part of the research and particularly 'reflection-in-action' during the design phase. There will be an interrogation of the model system, which will be refined where appropriate and necessary. A final design will encapsulate the findings that will develop through the design research and will then be analysed through 'reflection-on-action' and conclusions drawn.

The research involves interpretation and much of it will be 'subjective research'²¹. It therefore is critical to the study that there is effective analysis to 'ensure that the critical information gained from the research process can be applied constructively and is appropriate for the situation at

¹⁹ Linda Groat and David Wang, *Architectural Research Methods* (Canada: John Wiley & Sons, 2002), p.199.

²⁰ Ibid., p.199.

²¹ Linda Groat and David Wang, *Architectural Research Methods* (Canada: John Wiley & Sons, 2002), p.99.

hand.'²² The method of analysis through 'design research also helps designers qualify and quantify design's value'²³ during the process.

Concepts and ideas in the design process will evolve through diagrams, sketches, drawings and model making, which will act as an intuitive reflection throughout the process. Bryan Lawson describes how 'these images often mean much more to their authors than to others as they represent a sort of graphical muttering under one's breath, or thinking aloud.'²⁴ Similarly Donald Schön, suggests that we should think of the designer as 'having a conversation with drawing'.²⁵ A series of sketch books will be used to document the knowledge generated through uncovering and answering specific questions to design and will form an important part of the ongoing analysis and reflection of design, through 'reflection-in-action'.

The concluding analysis of developed knowledge will involve quantitative and qualitative methods. It is described by Austin and Coleman that the 'way the collected data are evaluated and measured will also flow out of the research process. Looking for patterns in the frequencies of responses is a valuable way to assess information available from quantitative tools... Looking for consistencies in the responses to qualitative discussion questions posed is also important.'²⁶ The combination of qualitative or quantitative research tools, ranging from surveys to interviews, discussion groups to observations and information already available will be utilised to shape outcomes.²⁷ Aspects of the design project can be quantified and measured against built and tested case study examples, using them as a benchmark. Benchmarking establishes a method by which projects and processes can be analysed and comparatively evaluated against design precedents. Support from these different research areas will help generate insights to outcomes but will 'not direct or define decisions – instead, they simplify them'²⁸ to aid in drawing conclusions, in 'reflection-on-action'.

3.5.5 The role of experts and critics in the reflective process

Meetings and design reviews with professionals skilled in various aspects of the research are conducted to obtain advice throughout the research process and ideas on design. Experts in the field of vernacular design were approached throughout the research process to discuss issues, share knowledge and to gain specific advice to guide the research process. These experts included Gerallt Nash, curator of St Fagans National History Museum, Richard Suggett and Rachael Barnwell from RCAHMW and Joe Daggett from the National Trust. In addition to these key figures, contact was made with a range of specialists in the field involved in certain aspects of the research.

²² Sally Augustin and Cindy Coleman, *The Designer's Guide to Doing Research: Applying knowledge to Inform Design* (New Jersey: John Wiley & Sons, 2012), p.xx.

²³ *Ibid.*, p.6.

²⁴ Bryan Lawson, 'The Art of the Process' in *The Art of the Process: Architectural Design in Practice*, ed. by Louise Rogers (London: RIBA, 1993), p.10.

²⁵ *Ibid.*, p.10.

²⁶ Augustin and Coleman, p.xx.

²⁷ *Ibid.*, p.6.

²⁸ *Ibid.*, p.6.

Throughout the research by design process one to one tutorials with my supervisor Wayne Forster and other significant architects practicing in Wales, including Chris Loyn and Jonathan Vining were carried out to comment on the design based part of the research. At various stages of the design work reviews were held with peers/architects working in the Design Research Unit Wales. Presentations were also made to researchers in the school in research seminars and conferences, in addition to papers presented in international conferences. Critiques were also executed at various stages to draw conclusions to the research by design at significant points. Simon Unwin was involved in design reviews to provide advice on the direction of the research. His broad knowledge of the vernacular and understanding of the key elements of architecture and identification of place offered guidance for the study. There was an opportunity to meet and discuss research objectives of the thesis with David Leatherbarrow during his visit to the Welsh School of Architecture. Ideas relating to the designs were talked about with architects and designers Dorian Bowen, Dualchas Architects, Rural Design and David Lea. All these meetings and design reviews gave the opportunity to review work in progress and take forward opinions, inspiration and specific advice from people from a variety of different backgrounds in design and research to test the design objectives of the thesis.

On reflection following the pilot design study it was recognised that the influence of an expert acting as a client for the design studies would aid in creating designs with more realistic outcomes to relate to current housing situations. In the second design study housing developers for the site in Pontcanna acted as clients for the project and provided consultation on the economic focus of the scheme. In the third design there were difficulties in finding a suitable client to review the project, but the scheme was entered in the RSAW Designing the Welsh Terrace Competition and was reviewed and shortlisted by a panel of judges. Phil Roberts, Chief Executive Officer of Warm Wales was able to provide advice on the final design involving his extensive knowledge and experience in social Housing. The progress of the scheme was reviewed at various stages with Phil Roberts.

3.6 Timeline of research

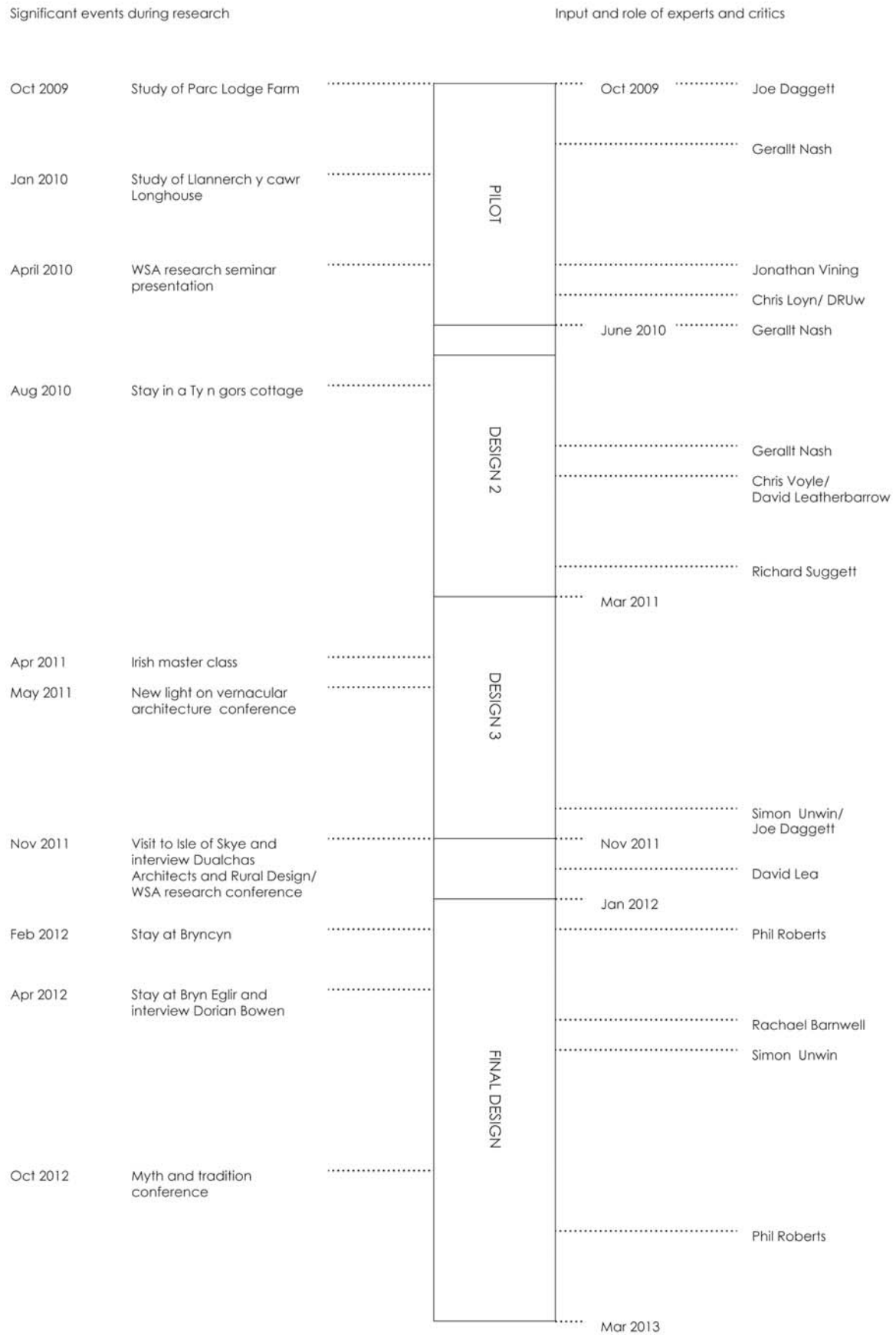


Fig. 3.7 Timeline of fieldwork and significant events which were carried out in relation to the design studies in the research methodology

4.0 Individual rural dwelling

4.1 Introduction

This preliminary study is conducted as a pilot study in order to establish a framework for the main research. It will be used to test not only the constituent parts of the 'model' as an entity, but also the processes of research including the literature and contextual study, adoption of principles, design and analysis. The pilot study will be used to determine whether the proposed methods of study are appropriate and realistic to conduct in the timeframe and with the resources available. It will also be implemented to identify any potential problems in the research method, which will be reassessed for the following design studies.

The pilot study is based on the individual rural dwelling as there is a need for new affordable houses currently in rural Wales. Traditionally, the individual rural house was predominant throughout Wales, in its various forms, up until the establishment of towns and cities formed during and since the industrial revolution. The study focuses on the Welsh longhouse as a typology that is often considered the 'quintessentially Welsh upland house'.¹ Iorwerth Peate coined the expression 'longhouse' from the term *tŷ-hir* literally meaning 'longhouse' used by many countrymen to describe this type of house.² He advocated the idea of the longhouse being the archetypal house of Wales.³ Although the longhouse typology is not unique to Wales, the type survived longer and in greater numbers than elsewhere, also owing to its significance in Wales.⁴ The longhouse tradition dates back to the Bronze Age and there is evidence of the typology existing across much of Europe.

The longhouse is determined for the pilot study as it is a prime example of the traditional Welsh house, built economically and resourcefully to fulfil requirements of the people. The need to address affordable housing in rural Wales today is significant to the study, as it is established in the *Rural Housing in Wales: Final Report* prepared by the Joseph Rowntree Foundation that there is an acute need for more affordable housing in rural Wales. This is partly due to rises in house prices and less availability of affordable housing stock, which has led to increased homelessness and is partly accountable for an out migration of young people aged between 15-29 years, resulting in a higher than average population over 65 years living in rural Wales.⁵

Longhouses demonstrate a number of principles intrinsic to vernacular rural dwellings across Wales, and also possess many unique characteristics. Built to meet the needs of local people, longhouses embody various traditions specific to particular regions of Wales and places. They

¹ Peoples Collection Wales <<http://www.peoplescollectionwales.co.uk/Item/35765>> [accessed 10 February 2012]

² Richard Suggett and Greg Stevenson, *Introducing Houses of the Welsh Countryside* (Talybont: Y Lolfa, 2010), p. 81.

³ *Ibid.*, p. 81.

⁴ S4C <http://www.s4c.co.uk/tycymreig/e_3hir.shtml> [accessed 10 February 2012]

⁵ Joseph Rowntree Foundation, *Rural Housing in Wales: Final Report* (York: Joseph Rowntree Foundation, 2008), pp.8-16.

reveal a response to the landscape through their form, orientation and siting. Longhouses are typically low and long in form and are built down the hillside, perpendicular to the contours of the land. They housed both people and animals under the same roof and people commonly lived in the upper end and the cattle in the lower end. A central chimney and cross passage separated the cow house from the dwelling and the cross passage formed an entrance point into both parts of the building.

Debate and interest surrounding the definition of the longhouse is extensive in literature. Peter Smith in 'Houses of the Welsh Countryside' redefines lowerth Peate's description of the type and its distribution. Smith's more detailed definition of the longhouse dismisses many of the buildings Peate regarded as longhouses, narrowing their distribution in Wales to those where the dwelling and cow house were built as a single form.⁶ In *Houses of the Welsh Countryside*, Peter Smith illustrates the distribution of longhouses as being predominately in South Wales⁷, rather than being a dominant house type throughout most of the counties of Wales⁸ as lowerth Peate suggests. The rebuilding and adaptations made to longhouses over the centuries makes it difficult to place their true origins, but the process of change and innovation of these houses is critical to the research. The dispute to define the true classification of the Welsh longhouse is irrelevant to this study, but the process of identifying the principles of the dwellings origins and the way in which tradition has been built on over the years is significant.

⁶ Peter Smith, *Houses of the Welsh Countryside: A study in historical geography* (London: Her Majesty's Stationery Office, 1975), p.446-455.

⁷ Ibid., p.448.

⁸ lowerth Peate, *The Welsh House: A Study in Folk Culture* (Burnham on Sea: Llanerch Press, 2004), p.53.

4.2 Literature and contextual study

4.2.1 Tradition of the longhouse

Three distinct traditional longhouses have been explored, with some reference to others, through literature and building studies. The objective is to understand the typology in depth, with the intention to identify the potential of this knowledge to inform the design of the contemporary rural house.

Three longhouses chosen as case studies for the research are identified to provide a broad analysis of the typology. The selected examples were determined from literature and from the authority of Geralt Nash, the curator of St Fagans National History Museum. The longhouses were also selected as they currently accommodate various functions, including a working farm, holiday accommodation and as part of the open air museum at St Fagans. This allows for examination and insights into the existence of the three buildings. The accessibility to the buildings was also an influencing factor. The longhouses are situated in south Wales in areas where longhouses are particularly common.

The longhouses are studied in literature, visited, measured and recorded. They are then drawn in a particular way depending on their present form and knowledge of their changing state.

- 1 Parc Lodge Farm, a working farmhouse in the Black Mountains near Abergavenny, is studied to observe how the farm has adjusted to modern ways of life and to examine changes it has undergone through history. The opportunity was available to survey and carry out measured drawings of this house as a volunteer for the National Trust. Measured surveying of the house allowed the form and layout to be analysed in relation to today's functions. The farm buildings' form and siting appear to be similar to that of archetypal longhouses, but there is evidence to suggest the dwelling was a hall house with a byre attached later, as there is no indication of there having been an internal connection between the human and the cow house. According to Peter Smith's definition, this would not be considered a longhouse, but it is still a significant example to study, particularly because it still remains a working farm.
- 2 Llannerch y Cawr longhouse, located to the south-west of Rhayader, in the Elan Valley, Breconshire was suggested by Geralt Nash to research as an exemplary Welsh longhouse.⁹ The building was visited and experienced on two occasions at different times of the year, in snow in winter and in sun and rain in summer. The building contains many typical characteristics of the typology and closely relates to the surrounding landscape. It has been conserved and made habitable for people to rent as holiday accommodation. The longhouse is redrawn from measured surveys carried out by Garner Southall Partnership who were involved in the restoration of the

⁹ Suggested by Geralt Nash, curator at St Fagans: National History Museum

building. The drawings are made to express the construction and spatial form of the longhouse.

- 3 Cilewent longhouse, now situated at St Fagans near Cardiff was chosen to provide an insight into how people who shared these buildings with animals once lived. Removed from its original location it is difficult to place it within the cultural landscape it once belonged. The museum has restored and displayed Cilewent as it would have been after it was modified in 1734. It shows a static representation of the house at this time, which is useful to study as it presents an authentic view of how the dwelling would have been lived in at a point in time. There is also extensive research existing on this particular longhouse which is useful to use as a comparison against the other case studies. A detailed survey of this longhouse was performed, measuring and recording how the dwelling was inhabited in the way it is exhibited at St Fagans National History Museum, including arrangement of furniture and material textures of surfaces.

4.2.2 Characteristics and principles

Characteristics and principles extracted from traditions of the longhouse found primarily in the three cases studies are identified and placed under five main headings established in the framework in the methodology. These are physical environment - climate, siting, orientation; construction; form; human factors; and function. Within these main principal categories there are multiple associated themes, which are interconnected and overlap in some cases. Principles and characteristics of the longhouse are presented under headings below.

Physical Environment - Climate, siting, orientation

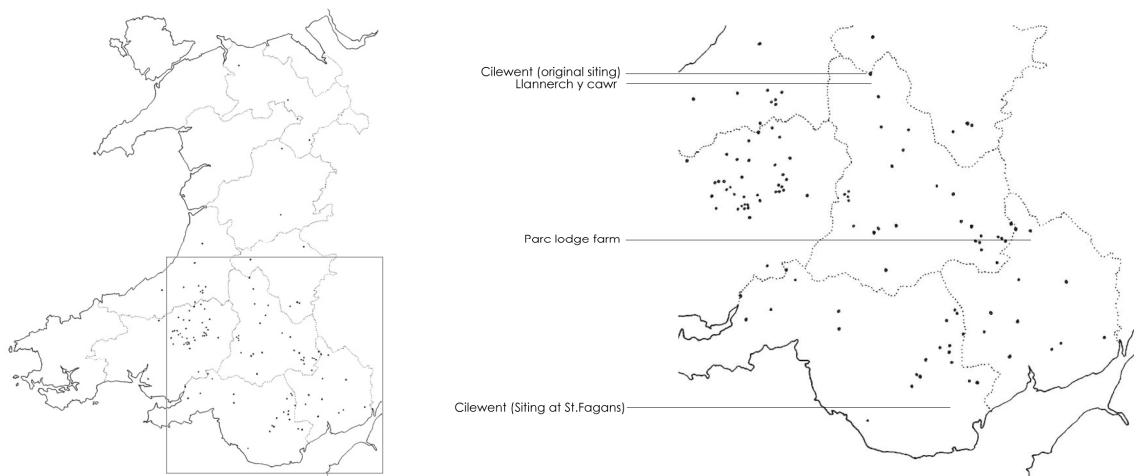


Fig. 4.1 Distribution of longhouses in Wales; Fig. 4.2 The locations of the three longhouses in South Wales where they are predominantly found

The three case studies share commonalities in their location, siting, orientation, topography and climatic consideration. The sites of the dwellings are located close to a source of water and are surrounded by resources for building and coppices for fuel. They are commonly situated close to where drovers' roads were once located, along which cattle would have been taken to be sold at market. Longhouses are situated down the contours of the land, part way up the hillside where the land drains. The dwellings are nestled in the hillside for protection from prevailing winds and their primary aspect faces the sun.

The longhouse form is climatically responsive to the regional climate (macro) of temperate conditions of mild, but often cloudy, wet and windy weather. The form is suited to the upland areas where much harsher and changing weather is experienced and temperatures drop by approximately 0.5°C every 100 metres. Rainfall also correlates with the topography and is highest in the most mountainous regions, with the wettest months commonly in the winter. Snow falls occasionally in the winter months from October to April, particularly on higher ground, and winds are highest in upland areas and by the coast. The prevailing winds blow from the Atlantic from the South or South West and move round to the West or North West as

the depression moves away, with the strongest winds from November to February. In spring there are higher frequencies of North to North East winds.

At a more localised scale, the climate of a specific place (micro) greatly varies depending on the topography and features of the landscape. Wind direction and speed are particularly influenced by the local topography and land use. Valleys funnel winds and hillsides can be exposed or sheltered depending on orientation and prevailing winds. Trees, vegetation and inclines in the ground can also provide wind protection.

Characteristically the form of the longhouse is built to take advantage of the landscape and climate of its particular setting. Sited for protection against the elements and built into the sloping ground, the thick stone walls of longhouses use thermal mass to retain heat from the sun. Small openings prevent heat loss but provide enough light to carry out daily tasks. Larger windows on the south elevations increase light levels and warmth into the buildings and openings are often splayed to soften glare inside the dwellings. A pitched roof directs rainfall away from the building quickly and clipped eaves protect from strong winds. The roofs are also constructed to carry possible heavy snow loads.

Although there are general similarities, each dwelling's response to its unique site is distinct and relates to the subtle intricacies of its place.

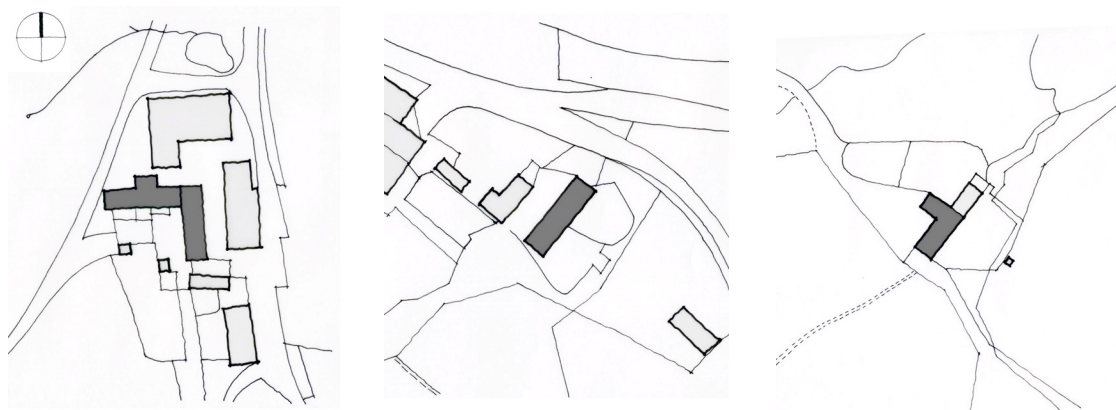


Fig. 4.3 Siting of Parc Lodge Farm, Llannerch y Cawr and Cilewent in their original locations. The three longhouses are principally positioned with their primary aspect facing south or south-east.

Parc Lodge Farm is orientated to protect itself from prevailing weather conditions on the eastside of the Sugar Loaf, with its primary aspect facing south. The house is built into the slope, down the contours of the land with minimal alteration of the ground. It is surrounded by numerous springs and streams, and open moor land neighbours the farm buildings on the highest ground, with open oak coppiced woodland further down the slopes. It is believed the existing house was built on the site of an earlier building, possibly used as a hunting lodge.

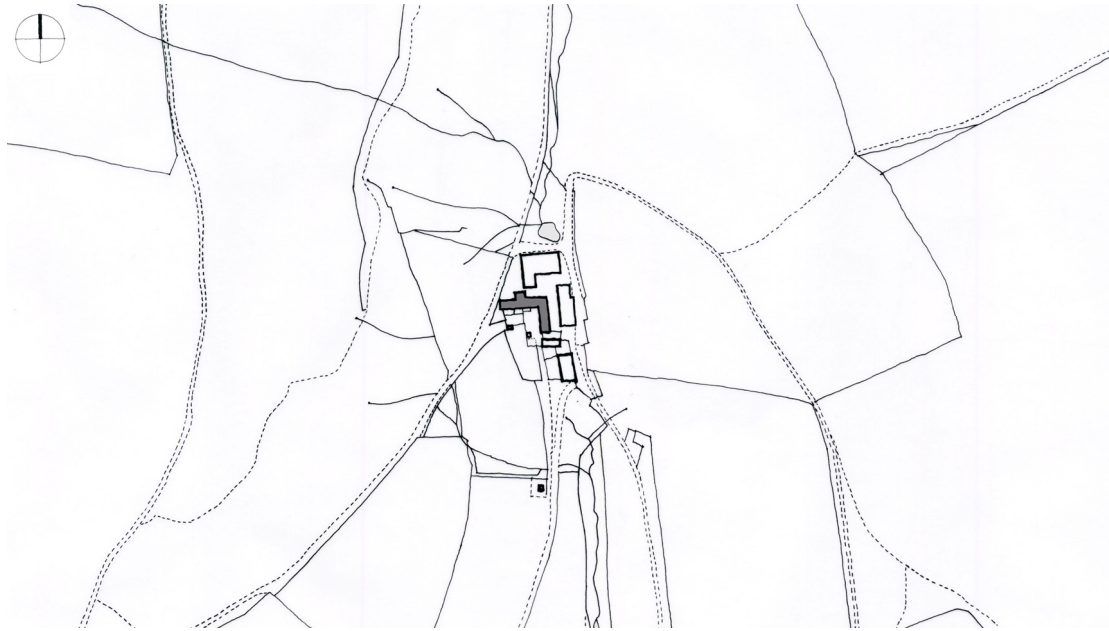


Fig. 4.4 Site map of Parc Lodge Farm 1:5000

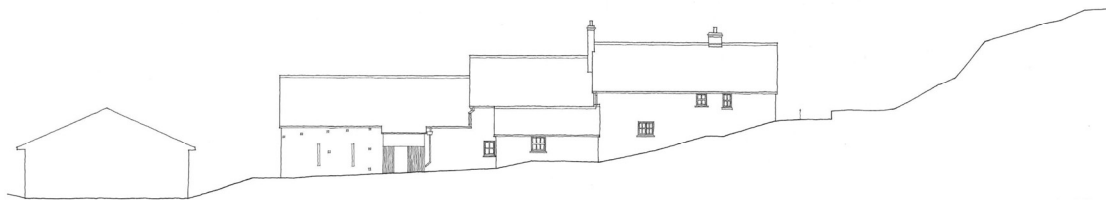


Fig. 4.5 North elevation of Parc Lodge Farm 1:500

The north elevation wall is considerably thicker than the width of the other walls and has fewer and smaller openings to prevent heat loss. Most window openings are south facing to gain maximum light but are small to reduce heat loss. The valley runs from north to south meaning a greater amount of direct sunlight reaches the farm buildings than on opposite slopes, therefore keeping the area warmer for longer. The L shaped form of the farmhouse and barns create a sheltered courtyard area. The west side of the farmhouse is built into the hillside allowing the building to retain heat through the thermal mass of the earth.



Fig. 4.6 South elevation of Parc Lodge Farm 1:500

The name Llannerch y Cawr, meaning 'giants clearing' originates from folklore, associating the boulder-strewn upland landscape around Llannerch y Cawr with giants. It is sited downhill in a north east direction, with its primary façade facing south east, orientated to protect itself from prevailing weather conditions. The foundations of the stone structure are built into the rock of the valley sides. A row of trees planted by the occupants provides shelter from strong prevailing winds. The recently built reservoir funnels wind along the water, but trees and vegetation provide protection from the wind.



Fig. 4.7 Site map of Llannerch y Cawr 1:5000

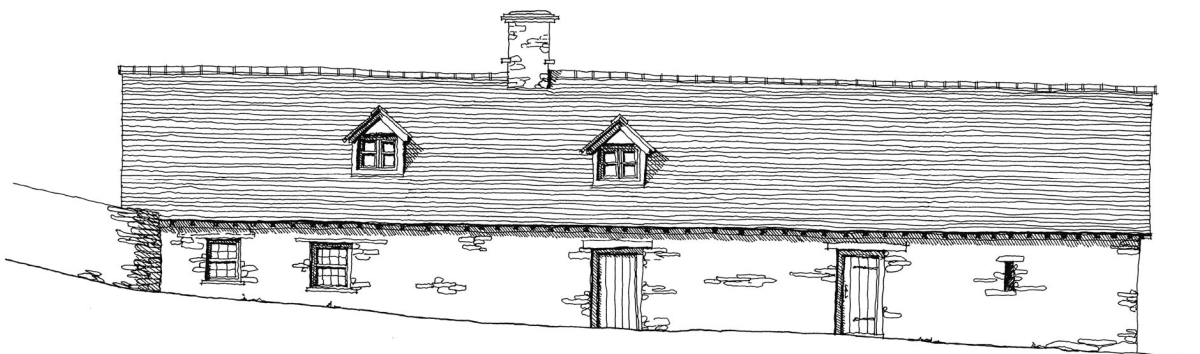


Fig. 4.8 South-east elevation of Llannerch y Cawr 1:200

Cilewent longhouse originally sited in the Claerwen Valley to the West of Rhayader and situated only 2.5 km from Llannerch y Cawr was positioned similarly on a north-east/south-west orientation, but on the other side of the valley to Llannerch y Cawr, built down the slope towards the south-west. The main façade also faced south-east. Cilewent has often been labelled *Ciloerwynt* on maps meaning 'shelter from cold wind'¹⁰, which suggests it was well protected in the valley, with the human dwelling nestled in the hillside to the north.



Fig. 4.9 Photograph of Cilewent in its original location taken in 1953

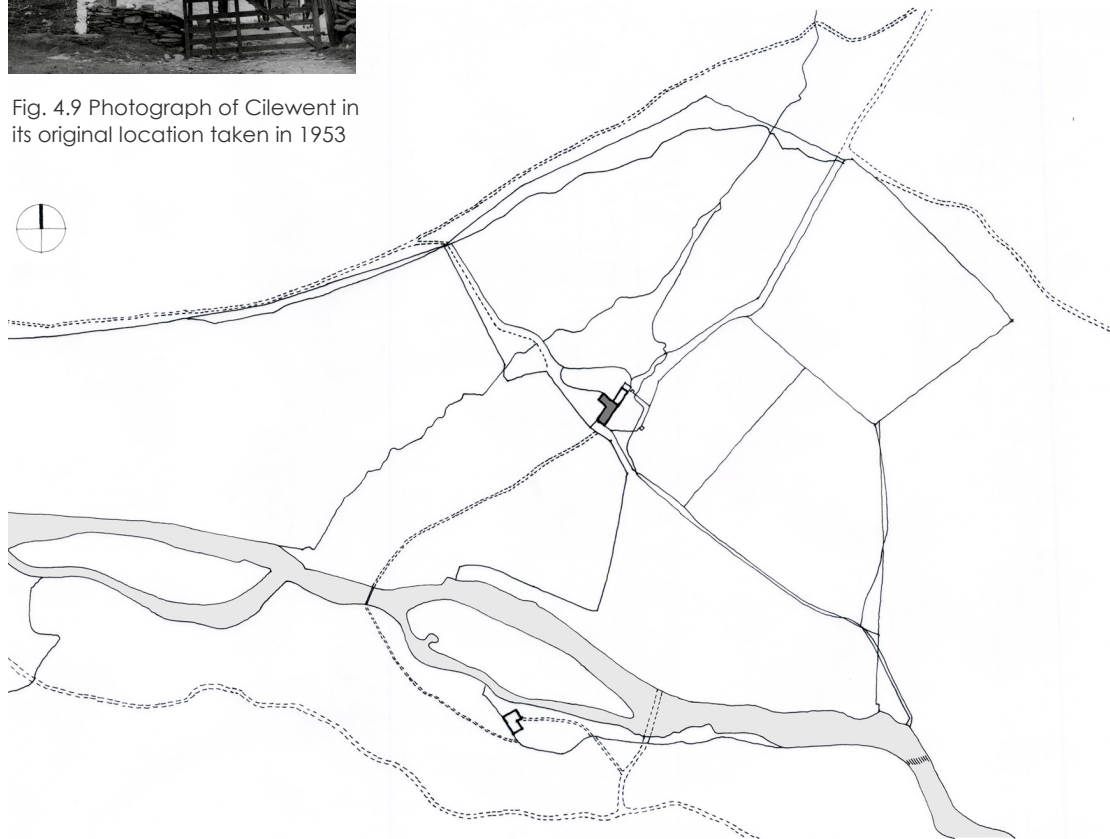


Fig. 4.10 Site map of Cilewent 1:5000

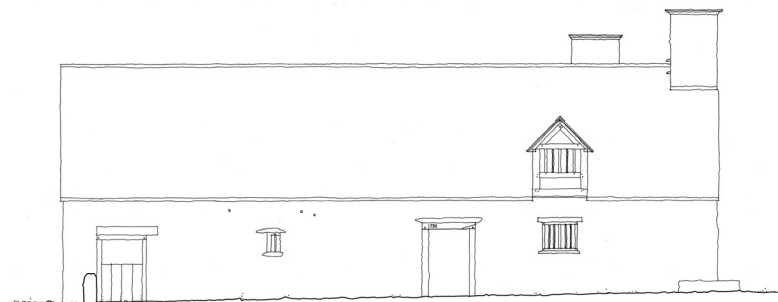


Fig. 4.11 South-east elevation of Cilewent 1:200

¹⁰ Eurwyn Wiliam, *Welsh Long-houses: Four Centuries of Farming at Cilewent* (Cardiff: University of Wales Press, 1992), p.27.

Construction

Longhouses were constructed from materials available from the vicinity of the site and built by local people and craftsmen. They are specific to their place through the materials used and the close relationship with the landscape. Materials available to a place dictated the design and structure of the buildings. It is believed craftsmen would have built the majority of longhouses that are still standing and they would have been owned by fairly wealthy families.¹¹ The structures tell us of the knowledge and skill of their builders passed down through generations.

The scale and form of the spaces in longhouse have been determined by the material properties of the resources available, such as spanning distances of timber and the nature of local stone. The proportions and size of longhouses can be placed within a range of different lengths and widths due to these restraints. Longhouses were built strongly but roughly, typically the walls were 600 – 900 mm thick and generally constructed of stone, depending on whether the stone was good enough in the area. Many longhouses were initially timber framed hall houses and the frame was covered in stones at a later date. A masonry chimney was often built as an even later addition.

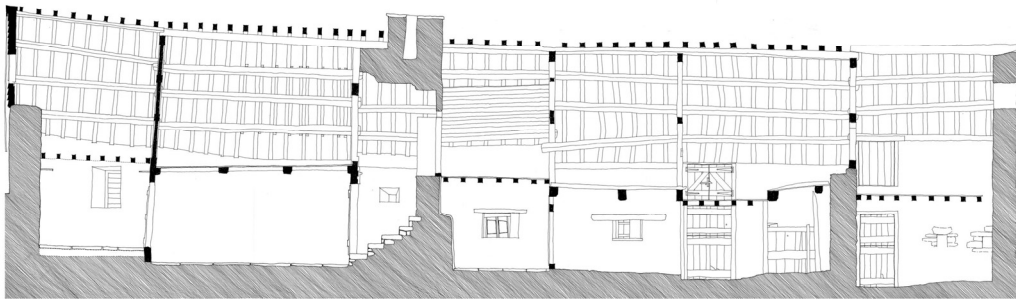


Fig. 4.12 Construction section through Llannerch y cawr 1:200

There was often a degree of choice available in materials, construction and plan form, and there were also trends as to which materials were commonly used at various times, partly to do with skills of craftsmen.

The three case study examples at present are primarily built of stone and oak, but there is evidence that some of these materials replaced older constructions and various newer materials have been added since.

¹¹ Ibid., p.6.

Parc Lodge Farm is built of rubble stone which has been whitewashed throughout. The local stone of the area is predominantly Old Red Sandstone which comprises of sandstones, mudstones, siltstones and limestones. Small abandoned quarries which scatter the area would have been the source for the stone walling and original stone roofing. Due to poor quality of stone in the area, the windows and door surrounds are wooden rather than built in stonework. The present cement tile roof was a recent replacement.

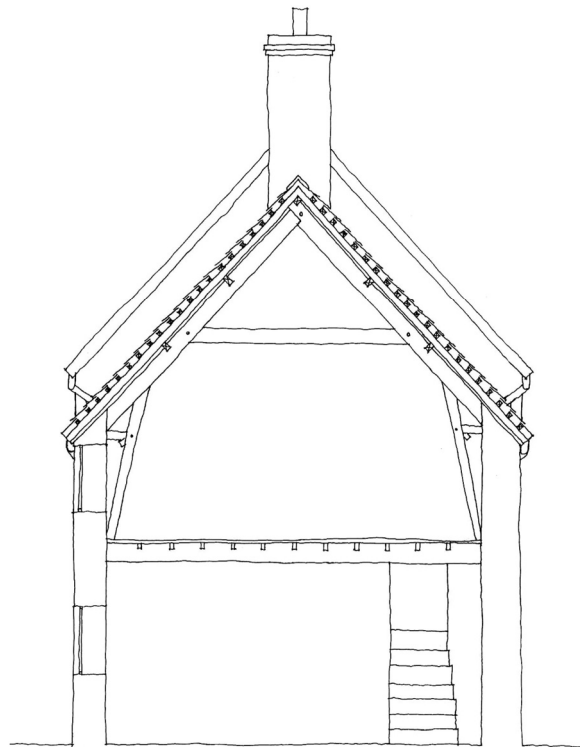


Fig. 4.13 Construction section through Parc Lodge Farm 1:100

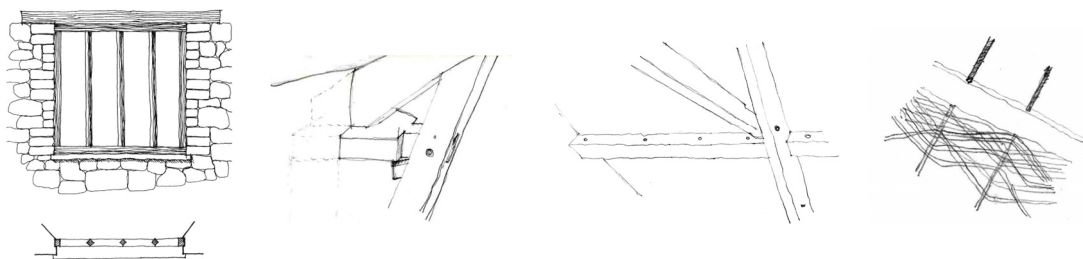


Fig. 4.14 Details at Parc Lodge Farm of diamond-mullioned window in barn; Fig. 4.15 Timber roof construction dated from 1550 to 1610; Fig. 4.16 Holes in the purlins in the roof which may have been for the framework of a woven wicker lattice ceiling; Fig. 4.17 Woven wicker ceiling as found at Hendre'r-yydd Uchaf at St Fagans.

Llannerch y Cawr is a typical stone built longhouse with cruck framed hall house origins and a stone slate roof.

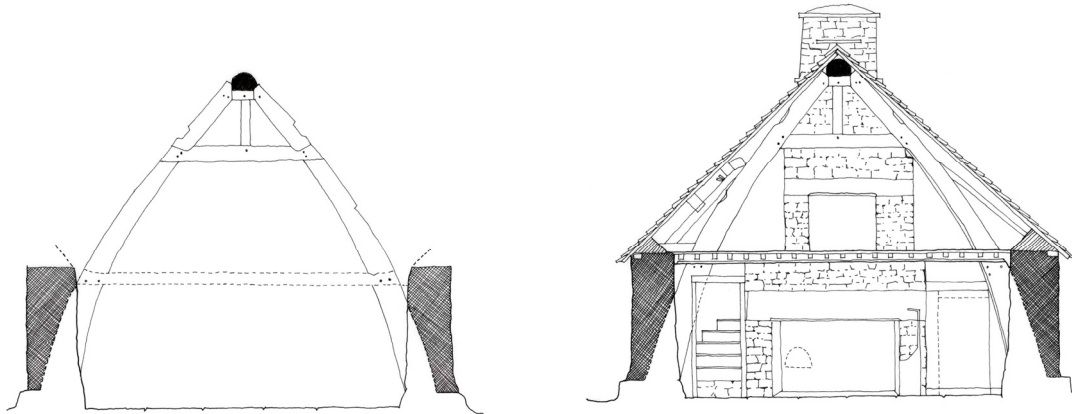


Fig. 4.18 Cruck frame construction at Llannerch y cawr

There is evidence that Cilewent was first built in 1470 using timber framed walls, in-filled with wattle and daub before it was rebuilt with stone in 1734. More robust stone and slate replaced the readily available timber which had become unfashionable by 1734. The original cruck frame was however reused in the rebuild. Even though the stone for the rebuild was gathered from the vicinity of the house, it shows how society had progressed since the house was first built. The craftsmanship of working stone and transportation of the material had improved which allowed alternatives to be considered for robustness and comfort rather than simply ease.

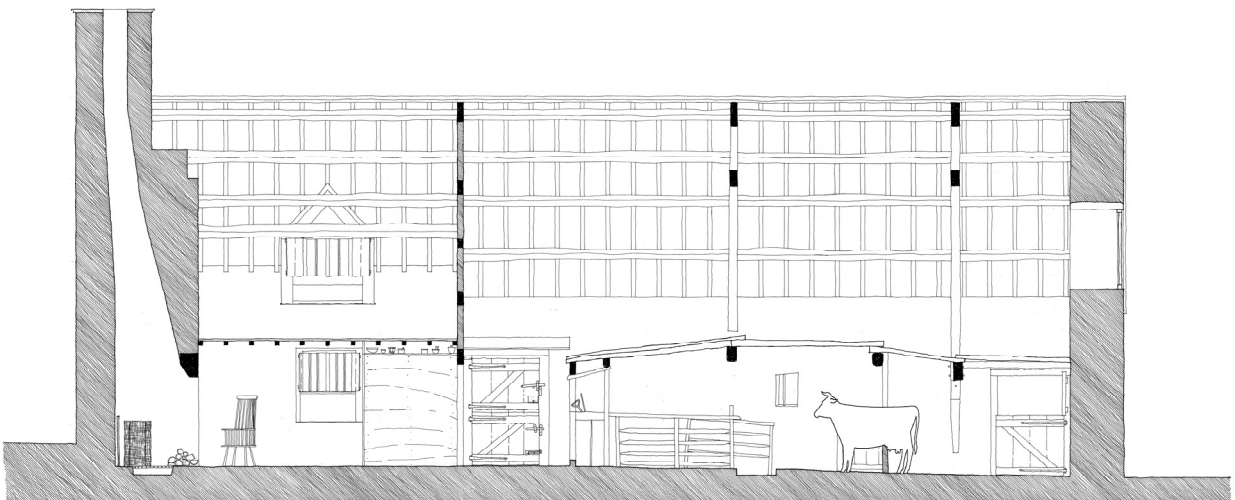


Fig. 4.19 Cruck frame construction with later stone built walls at Cilewent

Form

Principally longhouses were built of simple form, absent of concepts but built economically for pragmatic reasons, to provide the basic needs of shelter and warmth required by the people at the time. Initially form followed need and availability, with little outside influence on design. Builders took advantage of the environmental conditions of a site in locating form and the most efficient use of resources. Knowledge and skills in building were limited, so construction was direct and straightforward using local and available materials. Form was minimal and modest, built of rational geometries. Materials were put together with simplicity and economy, built with large stones, undressed and not squared. The basic elements changed little over the centuries, together with the materials they were made from, reduced to their essential functions and devoid of ornamentation. Elements were repeated where possible and set up in a rational arrangement that was dictated by the resources obtainable and basic need. The positioning of window openings for example appear to be haphazard from the exterior, but the outward appearance follows the internal functions of where light was required within the dwelling. The standard dwelling form was rectangular, as it remains today, primarily for practical reasons so spaces could easily be subdivided and extended or arranged in settlements. Space was used efficiently, the primary space was multifunctional and most activities took place in the one room.

It is often assumed and portrayed that longhouses were built solely to meet people's needs and to provide shelter from the elements. However, people who inhabited longhouses, felt a need to acknowledge their identities within their surroundings, to signify their belonging in the world as people do today. Conscious efforts were made to develop, import or elaborate forms and consequently specific styles emerged. Over time the architectural form developed from its roots in pre-existing hall houses.

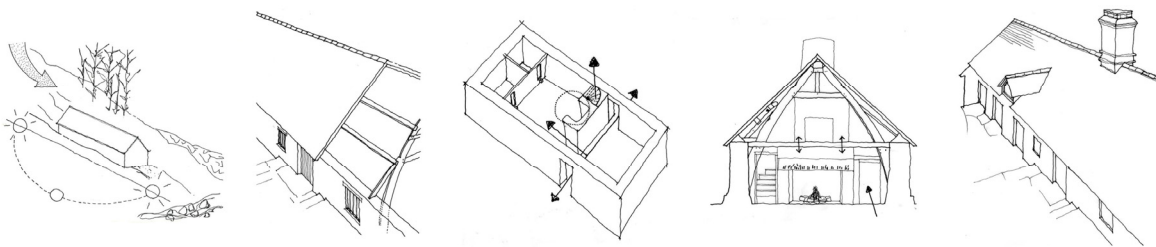


Fig. 4.20 Form built for pragmatic reasons with minimal adornment considering siting, resources and construction techniques available, in addition to function and human needs

The roots of the tradition however lie in the construction, not the form or style that evolved from it¹². However, alterations and identities that people make on their homes should not be ignored. In cases where longhouses are restored as with Cilewent, the buildings are often stripped back to their simplest forms, and restored to an earlier time, with later alterations and adornments removed. Cilewent is displayed as it would have been after it was modified in

¹² David Lea, 'Fake or Real?', *Planet: The Welsh Internationalist*, 138 (1999/2000), 77-83 (p. 79).

1734. This leads to assumptions that these buildings were lived in by less wealthy peasants, when actually they would have been updated and ornamented over the years, which later photographs and other sources can show.



Fig. 4.21 Photograph of Cilewent taken in 1953; Fig. 4.22 Cilewent now restored at the National History Museum at St Fagans stripped of the occupants possessions and displayed as it would have been in 1734

Human factors

The human factors influencing these dwellings refer to how society was organised in terms of community and private family life, impact of religious/spiritual beliefs and peoples aspirations and visions of status.

The farm buildings were fairly isolated from neighbouring communities, and the family members would have lived and worked within very close proximity to each other. Before a second storey was added to properties most of the daily tasks would have been carried out in the main hall.

The longhouses reveal certain cultural and social beliefs, meanings and values of the people who dwelt in them. The position of the fire in Welsh longhouses, where people and animals were housed under one roof was significant. Stemming from an early Celtic belief that fire protects animals from evil spirits and other harms, there was a conviction that 'warmth increases the yield of milk' and that cattle would yield more milk if they could see the flames of the fire.¹³ Keeping livestock at one end of a house and having the fire at the other end in addition to having being done for spiritual reasons provided a primitive form of central heating through the heat given off by the cattle. As well as keeping people warm, the fire also had spiritual significance and in some cases was never allowed to go out. Angled tear drop-shaped burn marks are found on the timber lintel above the fireplace at Llannerch y cawr longhouse in the Elan Valley. The multiple charred marks are clearly deliberate and not accidental tallow burns. They appear randomly spaced along the structural timber and are of a sizable depth and

¹³ Eurwyn William, *Welsh Long-houses: Four Centuries of Farming at Cilewent* (Cardiff: University of Wales Press, 1992), p.38.

length. It is believed they would have been placed intentionally in an attempt to induce protection of the building from fire, literally 'fight fire with fire'.

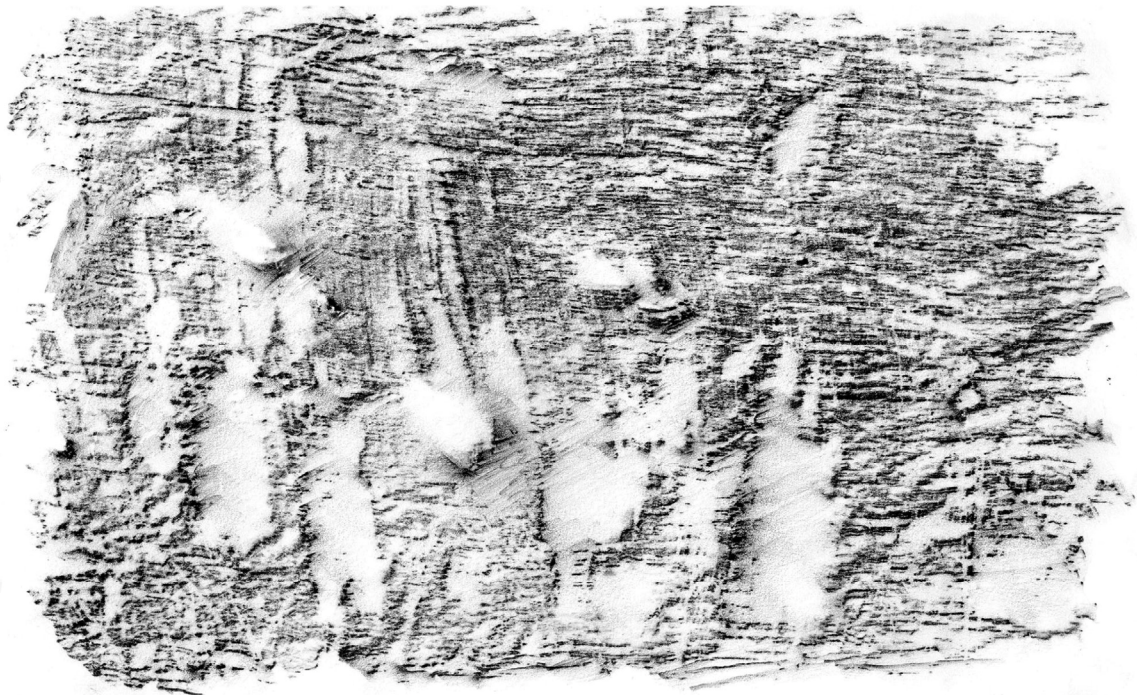


Fig. 4.23 Rubbings of angled tear drop-shaped burn marks at Llannerch y cawr

During the sixteenth and seventh centuries rearing of livestock was a profitable business particularly around the area of the Elan Valley. Farmers' economic dependence on their cattle meant they really looked after them and the proceeds of rearing and selling cattle were reinvested in their properties. At Cilewent, the cow house is larger than the farmers' living space and the layout was convenient so they could leave the house and feed the cows in winter with ease.



Fig. 4.24 Plan of Cilewent showing the cow house to the left and the living quarters to the right. It also demonstrates the different material finishes of the floor relating to the functions of the house 1:200

Building longhouses was a middleclass trend and alterations were often a public declaration of wealth of its owner. A square, stone chimney declared to everyone in the area a house was of status, as did a stone roof. Gilfach longhouse, situated in the Cambrian Mountains in Mid Wales within close proximity of Llannerch y cawr and Cilewent, appears to be a modest longhouse from three of its elevations, other than the façade which once faced a busy drover's road. This elevation has two large, quite elaborate timber gable roofs, built as a later addition. This was a deliberate decision by the owners to attract attention from the roadside and to show off their wealth.



Fig. 4.25 Gilfach longhouse with an elaborate elevation to the roadside to show off wealth

Function

Spatially humans usually inhabited the upper end of longhouses and the cattle the lower end, so that liquid manure would run away from the house and could be disposed of more easily. The entrance towards the middle of the building opens onto a cross passage which divides the dwelling from the animals and serves as a feeding walk. The cross passage with doors at either end was called the *penllawr* or *bing* (head of the floor). The upper end of the house would have been paved up to the *penllawr*, and the cow house would have been of the earth. A lean-to structure was sometimes added which would house a dairy, storeroom or calf box.

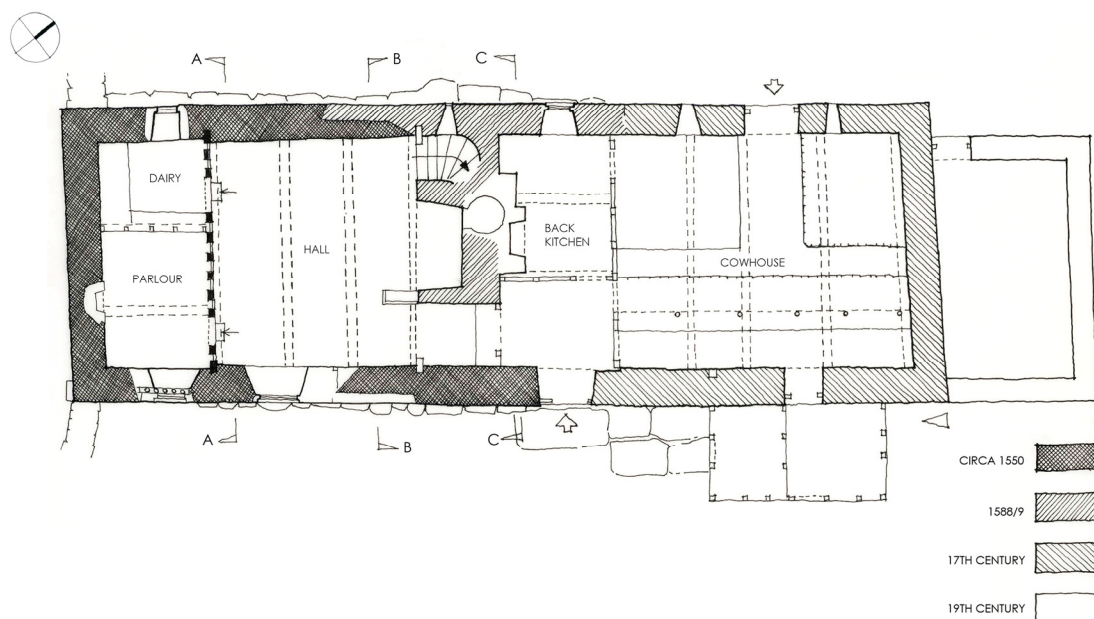


Fig. 4.26 Plan of Llannerch y cawr, showing when alterations were made 1:200

The character and usage of the main hall or living space varied depending on the wealth of the occupiers, when it was built and how it was modified over time. The flexibility and evolution of longhouses identifies patterns of innovation. In earlier longhouses the hall was the only space for humans to live, work and sleep. Initially the fire would have been centrally positioned within the hall without a chimney. The main space was flexible but was later adapted and modified for new ways of life. Fireplaces and chimneys were added and the addition of an upper floor creating a bedroom was exceptionally innovative at the time, providing greater privacy in the house. Both central and gable chimney long-houses are found in Wales, however central chimney stacks are most common in the south-east, where the hearth would be situated against the wall between the dwelling and the cow house. The hearth located against the wall introduced the opportunity to build furniture around it. The *sgîw* or *setl*, characteristic of Welsh farmhouses and found at Llannerch y Cawr longhouse, provided a bench by the fire which also screened out any draughts and sometimes contained a place for storage. The corner seat by the fire was believed to be a place of honour and guests were invited to sit in.¹⁴ Screens were gradually added to create separate rooms. Later dwellings were divided into two, three or four rooms. The extra space allowed occupants to follow pastimes independently. In Monmouthshire, Glamorgan and Breconshire it was common for the stairs to the upper floor to be positioned alongside the fireplace, built into the solid fireplace jamb.

The case studies all follow variations on this typical longhouse layout. Understanding how these houses have adapted to peoples changing needs over time is significant to the study. This can particularly be observed at Parc Lodge Farm. Tithe maps of the farm illustrate that in 1881 the main form of the building was L-shaped with a number of outer buildings to the south. By 1901 there are additional lean-to buildings to the north of the site. There is an extension to the east of the south end of the barn which does not exist today. Gradually more outer buildings were built and an extension to the N.E of the house was added. The maps suggest that some of these areas were quite temporary as they have frequently been removed or changed over time. By 1966 the drainage of the site had been altered and the river directed away from the house. Much larger farm buildings have been built on the site since.



Fig. 4.27 Tithe maps from 1881 to today (1881, 1901, 1911, 1966 and today) of Parc Lodge Farm

¹⁴ Iorwerth Peate, *The Welsh House: A study in Folk Culture* (Burnham on Sea, Somerset: Llanerch Press, 2004), p.117.

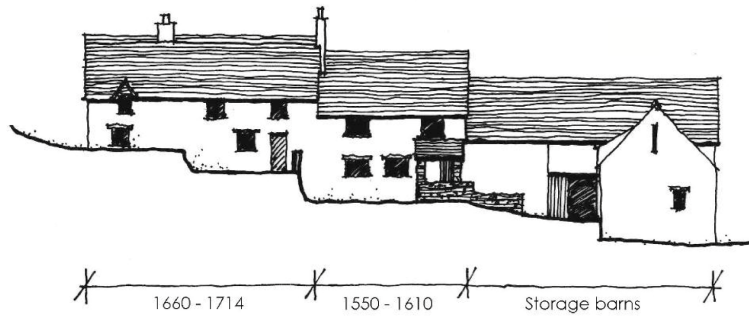


Fig. 4.28 The original farmhouse at Parc Lodge Farm was built between 1550 – 1610, with the upper part being built as a later alteration between 1660 - 1714. The storage barns were constructed more recently

Today the upper end of the house accommodates the family's dwelling and the lower end with a right angled wing is used for farm storage. It is probable that the upper part of the house has always been the human dwelling with cattle housed in the lower byre which was built later. The right angled wing which was added later again may have always been intended for storage. The previous layout of the farmhouse has informed to a certain extent the spatial arrangement of the current use of the house for new, different functional needs.

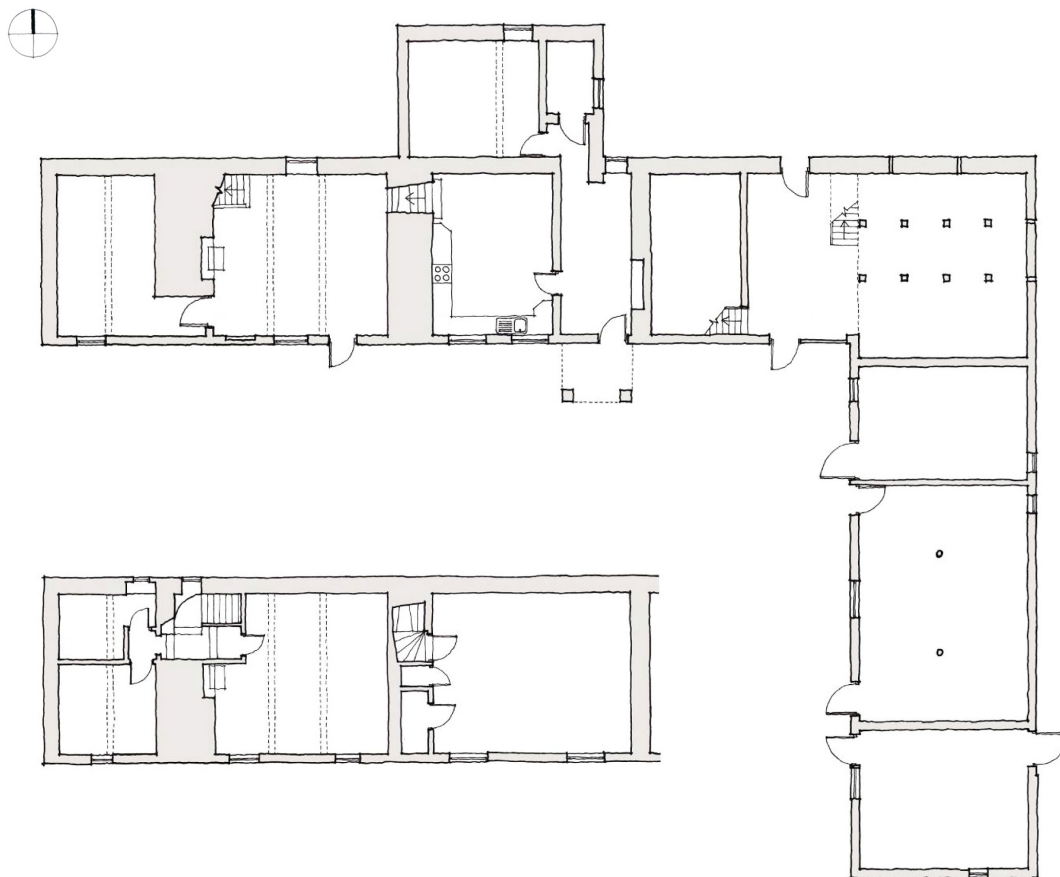


Fig. 4.29 Lower and upper floor plans of Parc Lodge Farm as it functions today 1:250

Llannerch-y-Cawr was built in the mid sixteenth century originating as a peasant hall-house. One or two generations later it was converted into a longhouse due to the increased profitability of cattle. The conversion of hall-houses into longhouses was common in Radnorshire at this time when rearing cattle was most profitable and theft was common. The house is particularly similar to nearby mid sixteenth century longhouse Nannerth-ganol.

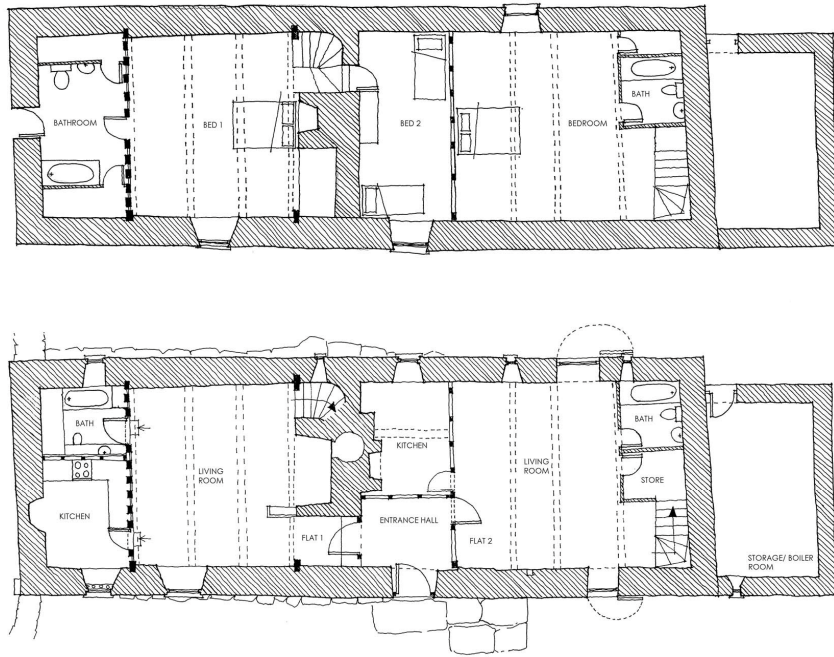


Fig. 4.30 Layout of Llannerch y cawr longhouse after it was converted into two holiday homes for let, showing the upper and lower floor plans 1:250

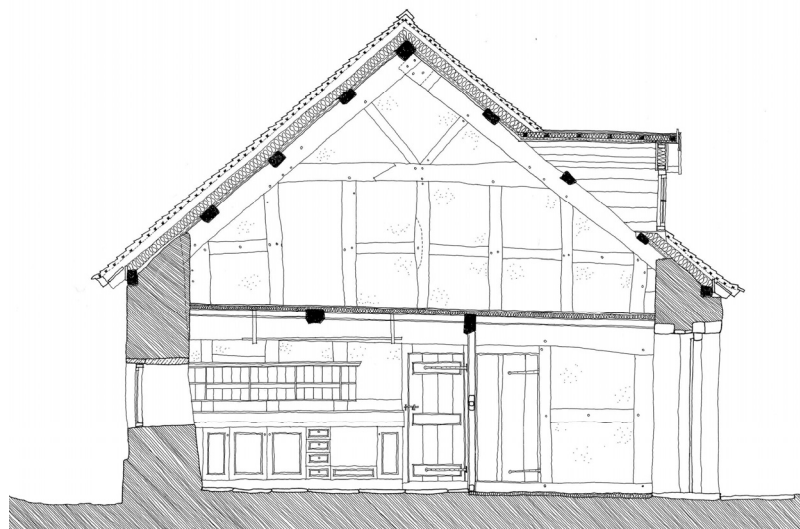


Fig. 4.31 Changes made to the building fabric at Llannerch y cawr in converting the longhouse into two holiday homes for let 1:100

The significant characteristics of longhouses can be seen at Cilewent despite its atypical layout. The original house would have been much simpler, without the wing at right angles to the main form and it is thought that the cross passage would have had doors at both ends.¹⁵ The requirement for more space led to the adaptation of the traditional longhouse form at Cilewent.

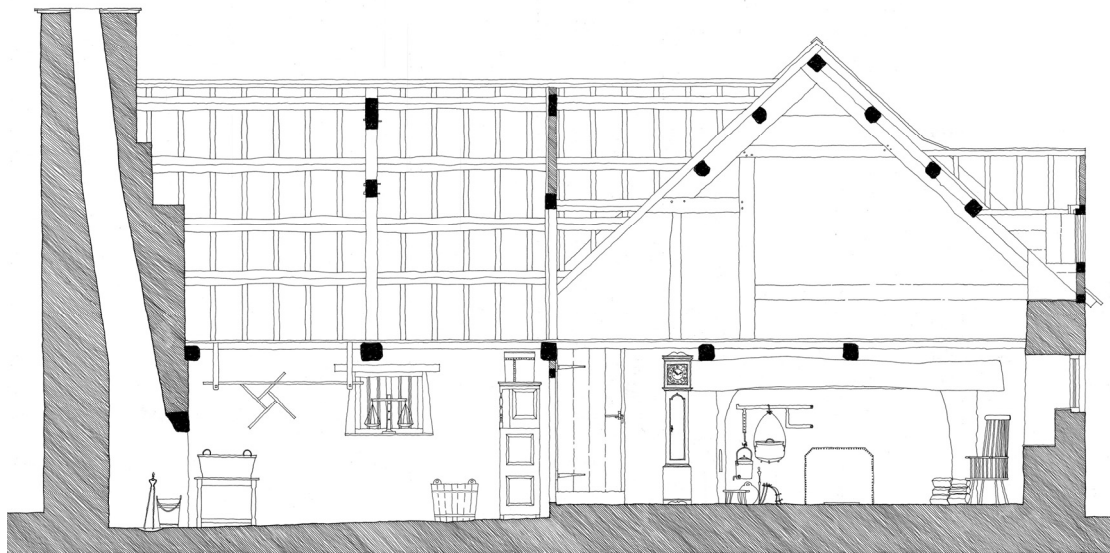


Fig. 4.32 A wing and an extra floor was added in the roof space to provide additional accommodation at Cilewent longhouse 1:100

¹⁵ Eurwyn William, *Welsh Long-houses: Four Centuries of Farming at Cilewent* (Cardiff: University of Wales Press, 1992), p.31.

4.2.3 Summary

The study into the traditional Welsh longhouse illustrates a number of typical characteristics within the typology. It also demonstrates that within the tradition there are specific qualities distinctive to the individual buildings relating to their particular place and the people who have dwelt in them. Despite Parc Lodge Farm not being considered a 'true' longhouse, it shares many common attributes with Llannerch y cawr and Cilewent longhouse. Through studying Parc Lodge Farm it gives an insight into how the farmhouse has been inhabited up to the present.

Research into Parc Lodge Farm, Llannerch y cawr and Cilewent reiterates how the longhouse form is typically responsive to climate and landscape in their siting. The positioning and orientation is thoroughly considered in order to take advantage of the specific circumstances of place. It is evident that generations of inhabitants acquired an intimate understanding of the land. The buildings are integrated into the landscape and are well suited to the climatic and geographical conditions – the longhouses are climate adaptive.

The dwellings are resourced from materials obtainable from within the vicinity of the site and they also show the skills of craftsmen and builders who constructed them. The examples of longhouses highlight how materials changed and were replaced at certain periods as new materials became obtainable and trends changed. The advancement of knowledge over time in the alterations and adaptations of longhouses demonstrate how the forms changed through a continuous process of small innovations.

Initially built for pragmatic reasons and to provide shelter to carry out the households daily activities, the three longhouses display a simplicity and straightforwardness in their means. However it can be seen that with time ornamentation and adornment was applied to aspects of the dwelling forms, particularly in the interiors. Alterations were also made to the exterior as a status symbol to highlight to people in the area of the occupiers wealth. The economy of the household at various points in time greatly affected the form of longhouses. Initially they were built for farmers' dependant on their cattle to provide a secure place to house them in winter and protect them from thieves. As the occupants acquired wealth, they would re-invest the money in their dwellings.

Originally, myths surrounding the hearth were significant in determining the layout of the dwellings in relation to the cow house and the rituals carried out in the house. Spatially Parc Lodge Farm, Llannerch y cawr and Cilewent have very different layouts and functions today as needs and society have changed and it is now not accepted to live in the same building as the cattle. However it can be observed that initially the dwellings would have been similar in their arrangement. The durability of the three longhouses and the changes the buildings have undergone over the centuries, which are still inhabited today in various forms is related to the process of tradition and innovation applicable to design today.

4.2.4 Case studies - Contemporary rural house

Three contemporary case studies are selected as exemplar designs from published literature to illustrate how current architects have identified and translated elements from the vernacular and in particular the longhouse form to influence design. The case studies demonstrate principles from tradition can still be applicable today and can be incorporated with modern ways of living and new technologies in diverse ways. The designs are analysed and principles of design identified in terms of siting, form and arrangement, materials and construction and environmental issues.

The chosen case study houses are identified by the architects themselves as being based on tradition and this is also observed in literature and publications. The briefs set out for the projects are for single dwellings in rural locations. Two of the case studies are located in Wales and draw on principles of the Welsh longhouse in design, and the third example is situated in Ireland. The case studies show very different approaches to design to give a wide scope of investigation. Built examples identified are widely published and there was opportunity to visit the case study houses in Wales.

The case studies are by architectural practices Feilden Fowles, Design Research Unit Wales and architect Dominic Stevens. The former have both recently completed individual rural house projects in Wales, whereas Dominic Stevens' works are predominantly based in Ireland. Ty Pren by Feilden Fowles and Ty Unnos by Design Research Unit Wales are modern reinterpretations of the traditional Welsh longhouse. These examples were visited by the author to gain a more complete understanding of the building designs within their context. The objectives and briefs of the two practices are comparable, but there are differences in their approaches and outcomes. The work of Dominic Stevens is selected as it is dissimilar to the other projects and Stevens' notion of the vernacular provides an alternative perspective. He addresses social factors of dwelling with much greater significance in design and demonstrates a very affordable and resourceful solution.

It should be noted that the 'House for the Future' at St Fagans designed for a competition by Jestico and Whiles and built in 2000 was considered, but not chosen as a case study example. This is because it doesn't appear as relevant to design today, despite many detailed references to traditions evident from the houses at St Fagans. The 'Monad' house by Pierre d'Avoine Architects, shortlisted in the final six offers a more appropriate solution to the study in this thesis, as it takes inspiration from the very basic principles of tradition highlighted in the literature review by many architects and theorists as critical to design. These include a response to climate, use of locally sourced materials, simple and functional form, and significance of cultural and human aspects of living, over high tech responses to building. The judging panel for the competition describe the 'Monad' house as 'the least futuristic... but it was close to the sense of the judges that housing design may not change radically in the

immediate future and that older techniques and forms may in fact be more regularly used.¹⁶ The 'House for the Future' at St Fagans is therefore acknowledged, but not considered to be as relevant as other built examples identified in the thesis. The case study examples show how the fundamental principles of tradition and dwelling continue to provide valuable solutions to design and should be integrated with innovative technologies for houses to remain timeless.

¹⁶ Judges of 'House of the Future' competition, 'Competing visions', *Touchstone*, 6 (1999), pp.9-15 (p.9).

4.2.5 Ty Pren – Feilden Fowles

Ty Pren, designed by Feilden Fowles is situated in the hamlet of Trallong, on the edge of the Brecon Beacons National Park, north of Brecon. The 170m², four bedroom house was commissioned by Gavin and Davina Hogg, who manage the nearby Penbont Estate. Local timber resources available from the estate 'drove the design strategy throughout'¹⁷. The name Ty Pren, translates literally as 'House of Wood'. The context of the site and local vernacular were influential in the form and siting of the house. The traditional longhouse typology is referenced through a contemporary reinterpretation of the vernacular type in various elements of the design. The client and architect also strove for 'high standards in environmental design...so the project was largely performance driven'¹⁸ in a number of aspects of the architecture.

4.2.6 Analysis and identification of principles

Siting

Similarly to the vernacular longhouse approach to siting, Ty Pren follows the predominant orientation of longhouses on an east – west axis, with the primary elevation facing south to take advantage of solar gains. Passive solar principles have driven the elevation treatment and the framing of southerly views of Pen y Fan. However the sizes of openings on the south façade are much greater than that of a typical vernacular longhouse. 30% of the south elevation is glazed which is the most favourable extent of glazing to maximise solar gain in winter and minimise overheating in summer, this is compared with 5% glazing on the north elevation.¹⁹ Deep window reveals lessen solar gain through shading in summer and sliding shutters prevent heat loss at night and can be used to avoid overheating in summer. The long but shallow depth of plan allows plenty of natural daylight to enter from the south and passive cross and stack ventilation to take effect.

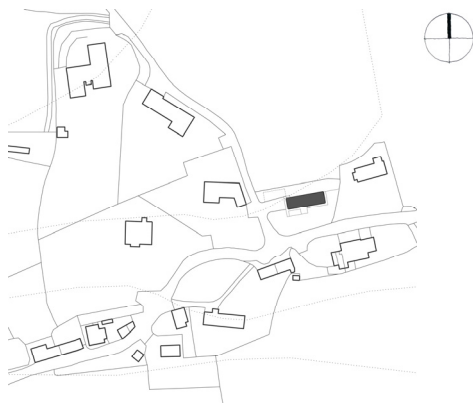


Fig. 4.33 Siting of Ty Pren in the hamlet of Trallong, with its primary aspect facing south

¹⁷ Felix Mara, 'Structural Insulated Panels: Feilden Fowles takes a fresh and rational approach to timber construction with its Ty Pren residential project', *Architects' Journal*, 16.09 (2010), (p.34).

¹⁸ *Ibid.*, p.34.

¹⁹ Design Commission for Wales, Case Studies – Ty Pren, <http://dcfw.org/casestudies/view/ty_pren/> [accessed 4 November 2012]

The form responds to the context of the surrounding buildings in the hamlet and is embedded in the hillside, built down the contours of the land. The cladding material used on the north façade is more robust than that used on the east, south and west elevations protecting against cold north winds and rain on the exposed site. The north wall is also effectively thicker as a 1m wide buffer zone runs along the length of the building, used to accommodate storage, services, en-suite bathrooms and the staircase, protecting the living spaces from colder northern weather.

Form and Arrangement

The form and layout of Ty Pren refers to a number of distinct characteristics of traditional longhouses. These are translated in parallel with contemporary ways of living and particularly to the lifestyle of the client. The house is entered at the gable due to access to the site, but the traditional cross passage is however suggested through aligned openings across the width of the house, providing views and a connection with the outside. Spatially the heart of the house and main living space is in the centre of the house as in the traditional hall of longhouses. The two ends of the dwelling are partitioned off to accommodate the utility room and guest bedroom. The dining space is a double height space allowing air to circulate. The low ceiling and steps down to the living area creates a more intimate space around the wood burning stove. The buffering north wall contains places for storage and utilities freeing up the south façade. It also houses the staircase.

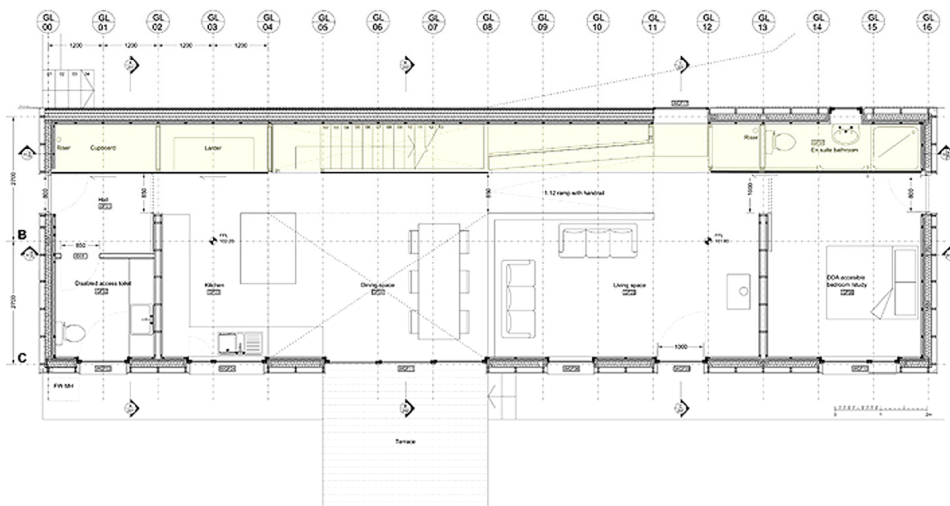


Fig. 4.34 Spatial and constructional layout of ground floor showing structural grid

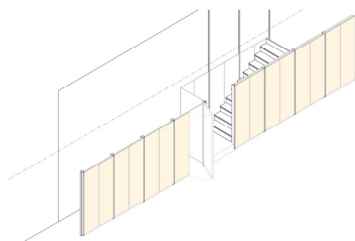


Fig. 4.35 Deep storage wall containing the stairs and utilities provides a buffer to the north of the house

Materials and construction

Initially through the clients choice and the availability of local timber the design was developed for the dwelling to be an entirely timber building, but based on the longhouse typology. A rigorous study of different timber construction methods and cladding systems were analysed and it was eventually decided that structurally insulated panels (SIPs) would be used over building a frame as it would produce a very airtight building. A secondary sheep's wool insulation was installed to lower the U-value and to create a thick wall depth similar to the local vernacular structures of the area. The modular SIPs are based on a rigorous 1.2m grid, which gives the building a coherence and clarity.

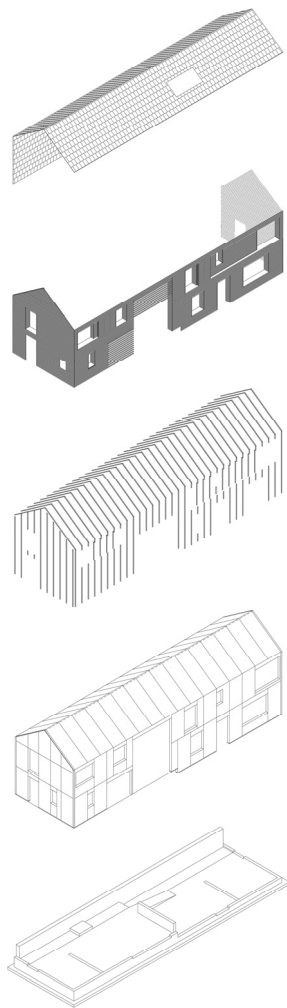


Fig. 4.36 Construction sequence from foundations to slate cladding on the north elevation and as the roof finish showing the layers of construction

Larch, sourced and felled from the client's estate 2 miles from the site was initially intended to be wrapped around the entire building. Concern about weathering of the untreated larch particularly on the north façade where it was unlikely to dry out, drove the decision for the north elevation and roof to be clad in reused Welsh slate, reclaimed from derelict barns on the

estate, providing a more robust finish. The larch is estimated to have a 25 year life span so when the larch needs to be replaced the old timber will be used to heat the house as fuel for the log burning stove. Eight trees were planted in place of the felled trees to allow for this cycle to continue. Internally, the north wall buffer space is built out of locally sourced oak studs and the internal doors and walling are constructed out of sustainably sourced birch-faced plywood.

It can be observed that local materials guided the design, particularly in the external appearance, however environmental design issues were more crucial to the approach in other aspects. Most of the visible materials are chosen for their aesthetic values and are natural, resourced nearby the site, establishing a connection with the landscape. The concealed materials within the construction however are sourced from much further away. Although the contractor who prefabricated the SIPs was based in Welshpool, the panels were originally manufactured in Europe, sourced for their performance rather than their locality to the site. The high performance windows were produced in Denmark enhancing the airtightness.

There are advantages and disadvantages of using the materials chosen. The larch cladding has a very low embodied energy sourced locally, but needs replacing fairly regularly. The embodied energy of the SIPs panels and the windows are much higher than alternative construction systems and products by more local manufacturers. The construction however is high performance and the materials provide low u-values and greater airtightness, reducing the whole life cycle energy.



Fig. 4.37 Slate cladding on north elevation

Environmental Issues

The house predominantly uses passive strategies to light, heat and ventilate, taking full advantage of the environmental conditions of the site, as well as adopting a highly insulated and airtight construction. In addition there are solar hot water collectors on the roof which supply hot water and supplement the underfloor heating system. The primary source of heat for the house, the log burning stove also acts as a back up boiler to produce added hot water. A heat recovery system circulates the warm air around the house.

4.2.7 Ty Unnos – Design Research Unit Wales

Ty Unnos, designed by Design Research Unit Wales is located in Ebbw Vale on the site of the former steelworks. The house was initially designed for the Future Homes competition as a 3 bedroom house. The entry won third place and was commissioned to be built as a visitor centre on the Future Homes Exhibition site, to be later converted into a 132 m² two bedroom house. 'The aim of the project was to target PassivHaus equivalence and Code for Sustainable Homes level 5.'²⁰ The house was designed as a modern reinterpretation of the traditional Welsh longhouse using locally sourced materials and local knowledge and expertise in developing the Ty Unnos construction system.

4.2.8 Analysis and identification of principles

Siting

As one of a number case study houses as part of a £300 million re-development project at The Works, the Ty Unnos house was designed without much knowledge of the surrounding built context. The whole site is planned to include 720 houses, a hospital, an education and business centre. The house orientation and siting however is informed by the environmental and landscape conditions of the place, positioned in a similar way to Ty Pren and traditional longhouses on an east-west axis. The south elevation is heavily glazed to maximise heat gains and light into the living spaces. The north façade has fewer openings to minimise heat loss and services are arranged along this wall. To the south are views across the valley and from the upstairs bedrooms, views can be seen up and down the valley to the north and south.

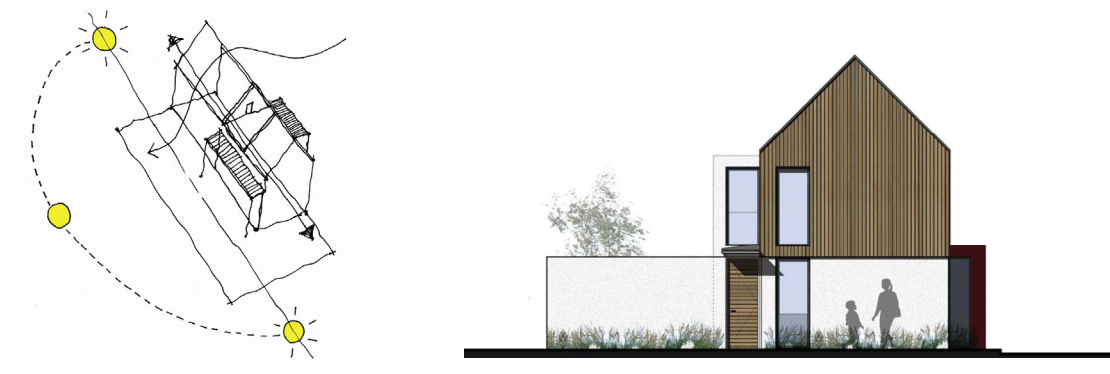


Fig. 4.38 Concept of Ty Unnos longhouse showing main aspect facing south; Fig. 4.39 East elevation

Form and arrangement

The Ty Unnos system is 'perfectly suited to a simple longhouse form, allowing an optimum configuration of Sitka Spruce frames to create a linear "tube"'.²¹ The system uses standard timber sizes and has been developed so that modular rooms are created depending on the

²⁰ Design Research Unit Wales, *Dwelling: Low Carbon Research Institute: Low Carbon Built environment* (unpublished report, Cardiff University, 2011), p.26.

²¹ Design Research Unit Wales <<http://www.dru-w.co.uk/passivhaus.html>> [accessed 5 November 2012]

spatial requirements of the room. As the needs of the house change over time there is the possibility for modules to be added on and the flexibility of the system allows for it to be applied to different housing typologies and sites.

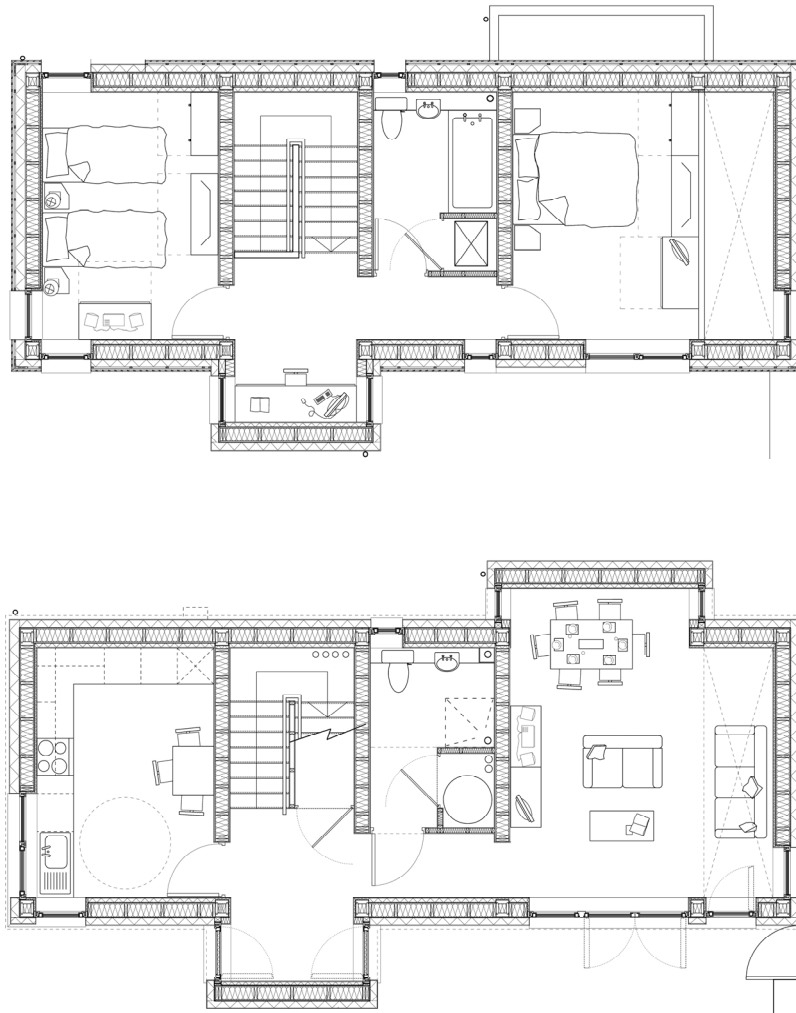


Fig. 4.40 Upper and ground floor plan showing spatial arrangement

Materials and construction

The Ty Unnos construction system was chosen for the project and was used to test the development of the system further. The aim for the house was to meet PassivHaus standards, but using materials local to Wales, rather than importing the accredited systems from central Europe. The name Ty Unnos comes from the tradition of building 'a house in one night'. The concept behind the tradition has been used to develop the system by local collaborators Coed Cymru and Design Research Unit Wales to utilise low value, home grown sitka spruce, which grows in large quantities in Wales. The material is unsuitable for structural use without being re-engineered as it can twist as it dries out.

The sitka spruce box beams are prefabricated off site to form the Ty Unnos timber portal frame, with Warmcell-filled Sitka Spruce ladder beam infill panels, Intello membrane and external insulation to achieve a u-value of 0.11 W/m²K and airtightness of 0.3 m³/m²/hr in the walls. The roof panels are the same Ty Unnos frame and infill as the walls. The Ty Unnos system is simple to construct using low-technology construction techniques. It was prefabricated in Welshpool and delivered to site in parts. Once the foundations were set out the frame went up with speed. The ground floor frame and infill was constructed in a day and the upper floor took two days to complete, relating to the speed of construction associated with the tradition of Ty Unnos.

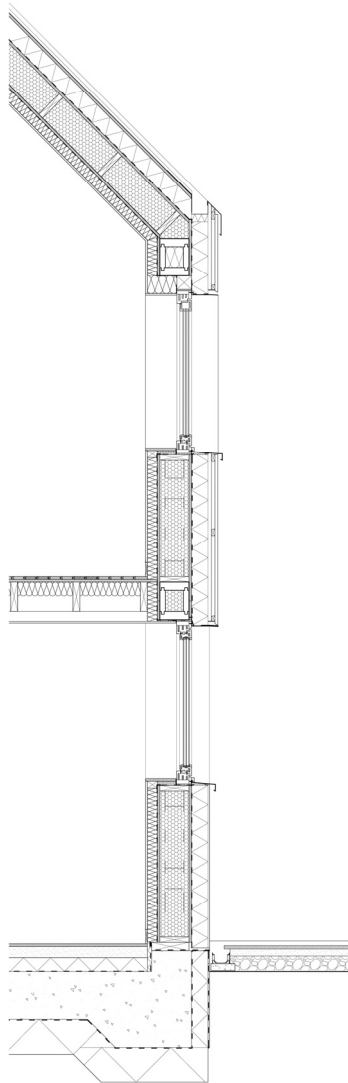


Fig. 4.43 Construction section through southern wall incorporating the multi layers of frame, insulation and membranes



Fig. 4.41 South elevation: standing seam metal roof, timber cladding, Welsh sweet chestnut windows and doors, external insulated render system

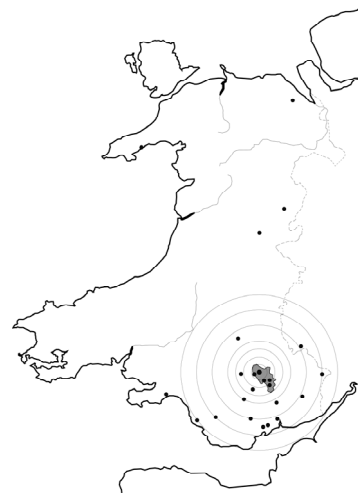


Fig. 4.42 Location of the material and product supply chain

Externally, at ground floor level an insulated white render system was applied and at first floor vertical Welsh sweet chestnut is used as a cladding. The roof uses a standing seam roof system. Panels on the elevations and the pop-out bays are painted red, drawing on the way in which colour is used to give identity to the home in Welsh valley terraces.

Around 80% of building materials, suppliers and sub-contractors were from within Wales. The chain of custody of many materials from raw material through process, manufacturing and distribution is unclear as local suppliers and small to medium sized enterprises (SME) were used, many of which use sustainable materials. The Sitka Spruce was sourced from sustainably managed forests by Coed Cymru, however the timber used does not have a FSC certification as it is not usually regarded as appropriate for construction.

Environmental Issues

The highly insulated and efficiently airtight building fabric, with minimal thermal bridges is heated through solar gains and primarily heated and ventilated by a mechanical ventilation and heat recovery (MVHR) system. The MVHR recovers warmth from exhaust air in the kitchen and bathrooms to warm incoming air which is circulated around the house. Solar hot water panels heat the water in the house. However a gas condensing boiler was installed as a back up to supply low temperature underfloor heating, radiators and the MVHR in winter if required.

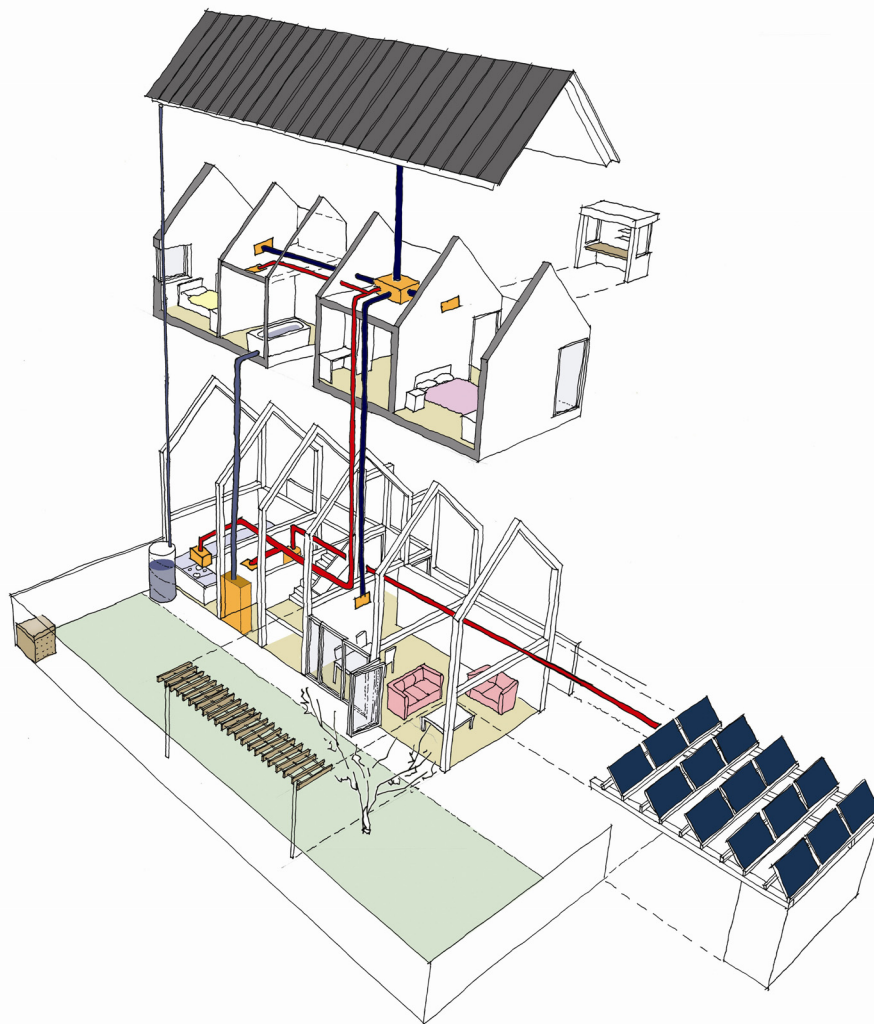


Fig. 4.44 Exploded axonometric of the environmental performance

4.2.9 House in Cloone - Dominic Stevens

Dominic Stevens design for his own house, which he self built in 2006 is located in the village of Cloone in County Leitrim in north-west Ireland. He incorporates his ideologies of learning from the vernacular in the house through his own way of life. He designed and constructed his house with assistance from his wife, students from Dublin University and the local community. His preference is to work with clients who want to build their own home, whether they want to build the whole thing or simply the fitted furniture. He feels that 'building one's own house is a vernacular tradition'.²² The house is built using local materials and affordable building methods that are can be adapted to the family's changing needs.

4.2.10 Analysis and identification of principles

Siting

Dominic Stevens explains that we can learn from the relationship of vernacular buildings to their surroundings, beyond the physical boundary of the site, considering site specific factors including topography, light and climate, based on environmental sustainability. He argues that form should be shaped through the choice and understanding of the site and knowledge passed down through communities. In designing his own home Dominic Stevens's commitment to his conviction of the significance of understanding the site and surrounding context is shown through him camping out on the site to intimately observe patterns of the sun and wind and learn routes, places of shelter and views out. The house exploits the natural advantages of the site through passive design.

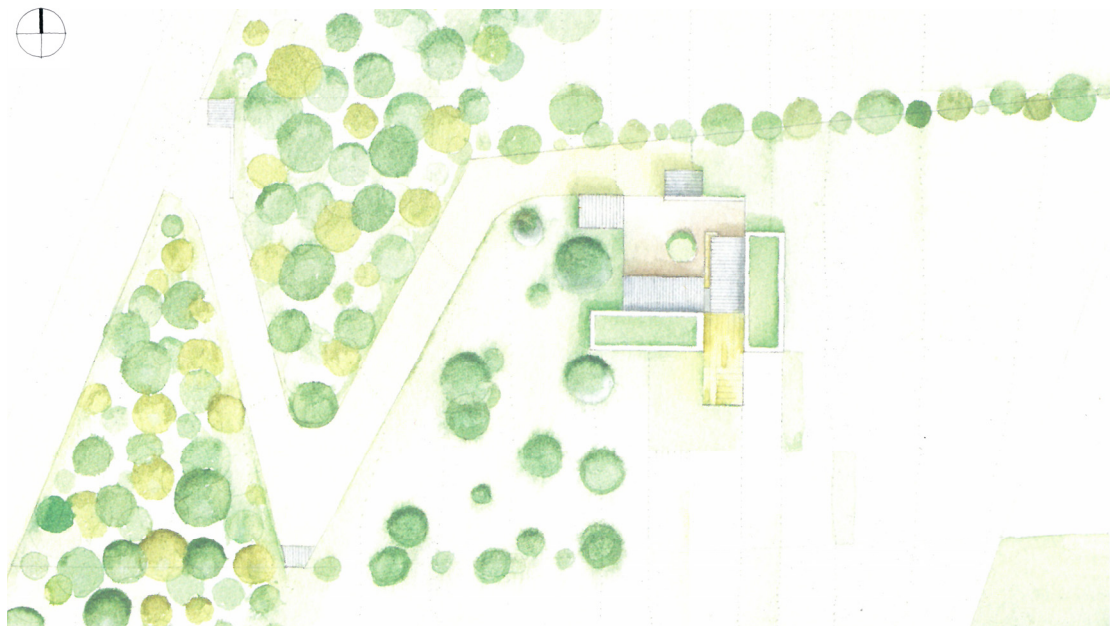


Fig. 4.45 House in Cloone sited in the landscape

²² Dominic Stevens, *Rural: Open to all, beginners welcome* (Ireland: Mermaid Turbulence, 2007), p.99.

Form and arrangement

To Stevens, the new 'vernacular' involves the self-build by amateurs, of affordable homes, which are not a commodity, but are a communal effort by the local people. He argues against an objective of new buildings being in a vernacular style as he feels, 'it is a way of being'. He claims the 'vernacular tradition is not a style that you can make a pastiche of, but it is a robust, pragmatic tradition.'²³ He believes that these vernacular ways have been lost as people have a tendency to overlook the qualities of the familiar.²⁴ Stevens explains how the house was built in sections over time, 'at no particular point did we start, finish, and move in. It's not the house as a product, it's more the house as a process. Over the life cycle of our family growing, it can constantly adapt to the needs of different ages of children. The house is amorphous as opposed to static.'²⁵

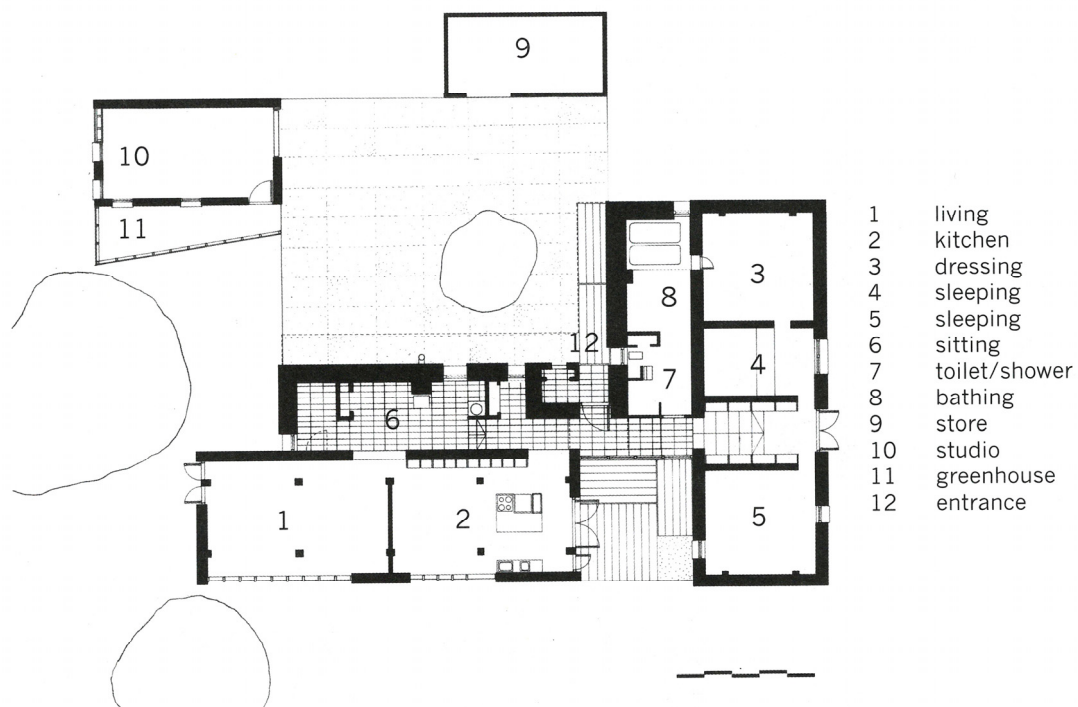


Fig. 4.46 Plan of house

The thick straw walls represent earth bound excavated spaces. They are in-between places that do not have an official function. Whereas within the timber frame elements, the functions of living happen including cooking, eating and sleeping. A studio is located across the courtyard of the house as a workplace.

²³ Stevens, p.66.

²⁴ Ibid.

²⁵ Dwell <<http://www.dwell.com/house-tours/article/emerald-rough>>[accessed 10 July 2013]

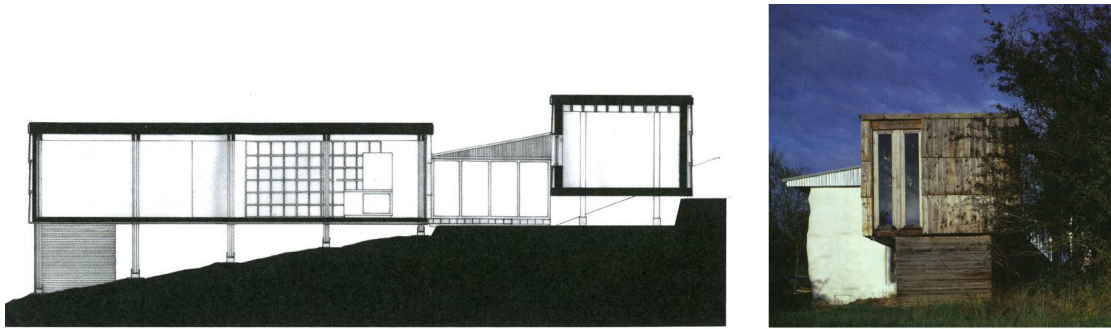


Fig. 4.47 House raised above the ground with minimal foundations and built by Dominic Stevens himself with assistance from his family and the community; Fig. 4.48 House responsive to climatic conditions of place and the context of the landscape

Materials and construction

The L shaped dwelling is constructed of two timber-framed boxes, raised above the hillside on stilts. The rectangular forms are positioned at right angles to each other facing south. The straw bale addition was constructed later. The design for Stevens self build home is inspired by the work of Walter Segal. The frame is designed to standardised sizes for sheet sizes of 1220 x 2440 and was prefabricated on site in a poly-tunnel workshop. The modular system allows for additional boxes to be added or taken away to meet changing spatial requirements.

The timber frames are clad in thin vertical shingles of palette wood – Sitka spruce, from the local sawmill and the roof is turfed in grass. The Sitka spruce has a lifespan of 7 to 10 years, but as Stevens explains it can be replaced with a more durable material such as cedar in the future. He describes how he likes 'the idea that the building can change its appearance radically. It's just a frame you can click different panels onto.'²⁶ The replaced spruce will then be used as firewood to heat the house once it has reached its life expectancy. The south facades are almost entirely glazed with windows fixed to timber struts with aluminium cover profiles. Thick straw-bale walls insulate the north façade. These walls are rendered in thick lime plaster both inside and out and are screen walls which at intervals are stack bonded and strapped to concrete blocks.

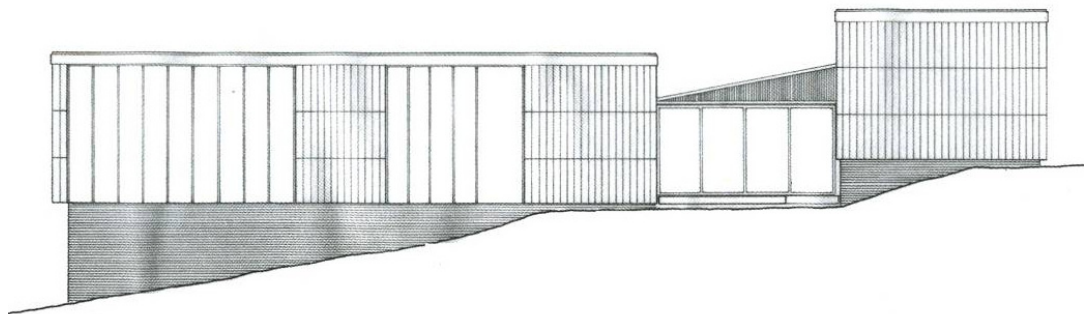


Fig. 4.49 South façade with Sitka spruce vertical cladding

²⁶ Dwell <<http://www.dwell.com/house-tours/article/emerald-rough>>[accessed 10 July 2013]

Environmental Issues

To Dominic Stevens learning from the vernacular is about practical principles that tradition has taught us, the simple, easy to construct buildings, made with locally available materials through passive means relating closely to the site and context. The house is therefore as low-tech as possible and has a minimal impact on the site.

The house achieves warmth in winter passively through extensive glazing on the south façade allowing sunlight into the house to heat up the north side. Heat loss is avoided by super insulated walls throughout the rest of the building. Large openings to the west and the east allow cross ventilation through the house in summer. The grass roof prevents heat loss and additional heat is supplied by a wood-burning stove.



Fig. 4.50 Low tech house using passive principles – large area of glazing on the south façade

The materials the house is built out of are biodegradable and Stevens estimates the house would disintegrate after ten year left unmaintained.

4.2.11 Summary

The three contemporary rural house case studies discussed demonstrate a wide scope of approaches to design incorporating concepts influenced from the vernacular. The designs establish specific attitudes towards siting, materials, construction, form, spatial arrangement and environmental issues. The case studies all share a similar reasoning and means towards siting dwellings in the landscape in terms of orientation and climatic considerations. They utilise the site through passive design strategies.

In terms of materials and construction, the three designs display differing perspectives on buildability and complexity, sourcing and accessibility of materials and durability and aesthetics. Ty Pren and Ty Unnos both use high tech systems built by specialists in comparison to Dominic Stevens self built house which uses a much simpler method of construction. However attitudes to sourcing materials for Ty Pren and Ty Unnos are very different. Ty Unnos is built of entirely locally obtained and manufactured materials to Wales, utilising the poor quality timber and re-engineering it to form the structure. The primary structure of Ty Pren however is imported from central Europe for its enhanced environmental performance, but the cladding materials are sourced only a few miles away from the site on a local estate, retaining a connection with place. Similarly to the house in Cloone, Ireland, the timber cladding at Ty Pren has a short lifespan and would need replacing regularly.

The forms of the two dwellings based on the Welsh longhouse are identifiably drawn from the traditional form both physically and in a conceptual way at Ty Pren in particular. The self build house in Ireland however is formed through site and context and an understanding what it means to dwell for the family. It is also formed out of the standard sizes of materials for construction, so it can be self built and economical.

In comparison to Ty pren and Ty Unnos, the house in Cloone is very low tech and easy to maintain and alter by its occupants. All three examples however utilise passive environmental strategies with the addition of solar hot water collectors and heat recovery systems at Ty Unnos and Ty Pren.

The examples demonstrate various valid approaches to design which hold advantages and disadvantages, but relate to the specific situations and conditions they have been designed for. The method of reinterpreting the vernacular taken by Dominic Stevens however appears most relevant to design in this pilot study. This is because it demonstrates an economical, local and resourceful attitude to design, in which the occupier's needs and interaction with the building are critical to design.

4.3 Principles

Following studies of traditional Welsh longhouses and contemporary reinterpretations of the individual rural house typology, a number of key principles are identified to employ in a design study. These principles are established by analysing the most fundamental influences to the design of the individual rural house.

4.3.1 Model for design

The degree of significance of principles relating to the longhouse is defined and illustrated in the hierarchy of needs diagram below, based on Maslow's hierarchy and using the principles determined in the operational framework in the methodology. The most fundamental needs are placed at the base and less significant factors towards the top. These are then related back to the operational framework through colour coding to determine the key influences that shaped the typology.

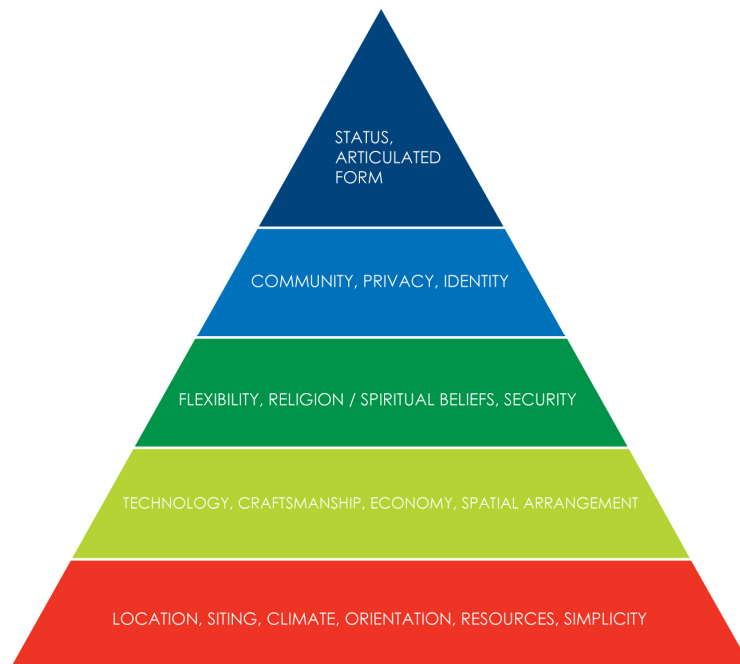


Fig. 4.51 Hierarchy of needs with the most significant needs at the base of the triangle

PHYSICAL	CONSTRUCTION	FORM	HUMAN	FUNCTION
LOCATION	RESOURCES	SIMPLICITY	COMMUNITY	ECONOMY
SITING	TECHNOLOGY	IDENTITY	PRIVACY	SPATIAL ARRANGEMENT
CLIMATE	CRAFTSMANSHIP	ARTICULATED	RELIGIOUS/ SPIRITUAL BELIEFS	FLEXIBILITY
ORIENTATION			STATUS	SECURITY

Fig. 4.52 Chart of influences affecting the rural house typology relating to the hierarchy of needs diagram

4.3.2 Design approach

From the hierarchy of needs based on the working framework of principles, the most significant factors affecting the design of the traditional and contemporary rural house are drawn up to inform the subsequent design study. These are listed below:

4.3.3 Principles

- Response to physical environment
- Simple construction
- Local materials and resources
- Economics
- Function and flexibility

4.4 Design

4.4.1 Introduction

A design study is then carried out to further the development of Rapoport's theory of the vernacular as a model system and to test the established principles through research by design in this pilot study based on the individual rural house in Wales. The proposal is prompted due to a shortage of affordable housing in rural areas of Wales, caused by rising house prices attributed to in-migration of people to rural communities and the purchasing of second homes. The situation has prevented young adults from staying in their local neighbourhoods, creating an uneven, predominantly elderly population.²⁷ The proposal will therefore aim to be affordable and it will be designed to be able to be self built so to reduce costs further.

New housing has caused dispute in rural communities, which has been accredited to and caused concern that 'increasing number of 'incomers' to rural Wales will erode the language and culture, traditionally considered to be strongest in the 'rural heartlands'. It should be noted however that these concerns may relate to either a lack of appropriate housing or the building of inappropriate housing.'²⁸ The design will attempt to reflect on these issues through a proposal which intends to be suitable for current housing needs, but relate to cultural traditions of place through the reinterpretation of the longhouse typology. The design study tests the principles identified from the traditional and contemporary case studies. The objective is for the design outcome to be responsive to the context of the site, be of simple construction for self build and utilise local materials and resources. The design also aims to be economical and to be functional and flexible, so that it can be easily adapted to occupants changing needs. These principles are formed from the longhouse typology and contemporary precedent of the individual rural house.

²⁷ Wales Rural Observatory
<<http://www.walesruralobservatory.org.uk/reports/english/living%20in%20rural%20wales.pdf>> [accessed 10 February 2013] (p.18).

²⁸ Ibid., p.21.

4.4.2 Brief

A design brief is established for a 2 bed house with workplace, which could also operate as a 3 bed house in rural Wales. This is driven by evidence that 'the majority of housing in rural Wales consists of medium sized and large dwellings... There is least provision for those looking for small properties.'²⁹ The design will therefore aim to be compact and minimal, with the opportunity for flexibility within the dwelling and expansion in the future as household needs change.

The location for the scheme is chosen as a site characteristic of where vernacular builders positioned longhouses in an area of Wales where there are considerably high numbers of the building type. An existing house on the chosen site is derelict, unsuitable for today's standards and doesn't appear to fit within its context. This prompted an opportunity to analyse the existing site for future use.

²⁹ Ibid., p.18.

4.3.3 Site



Fig. 4.53 Location of Site in mid Wales

The site for the rural dwelling design is located to the south-west of Rhayader, to the south of Caban-Coch reservoir in the Elan Valley, Breconshire. The site is 0.6 km south east of Llannerch y cawr longhouse and nearby the original siting of Cilewent longhouse.

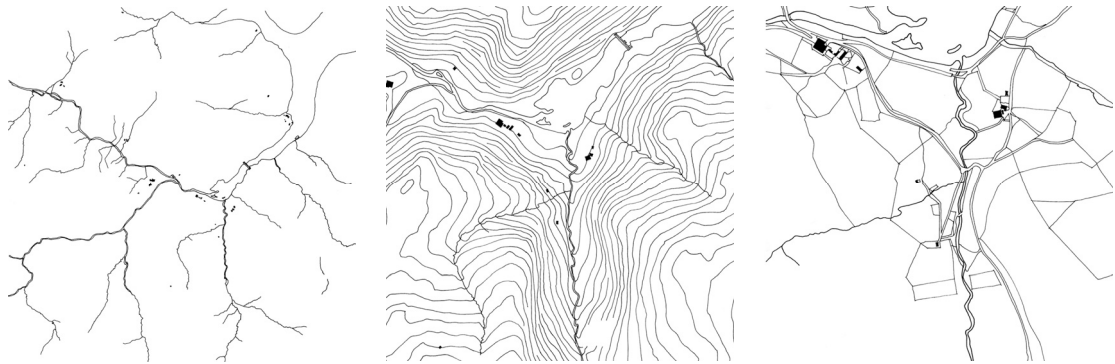


Fig. 4.54 Buildings and water Sources; Fig. 4.55 Buildings, water sources and typography; Fig.4.56 Buildings, water Sources, field boundaries and routes

The area is sparsely populated with clusters of settlements scattered in landscape. Traditional buildings in the area are within close proximity to a source of water and located in the valleys part way up the hillsides. Field boundaries and transport routes divide the lowland, whereas the higher ground is much more open and would have once been common land. A heavy flowing river runs down waterfalls down the valley from the south into Caban-coch reservoir. There is a redundant stone quarry to the south of the site. The stone in this area is made up of Silurian and Ordovician rock.

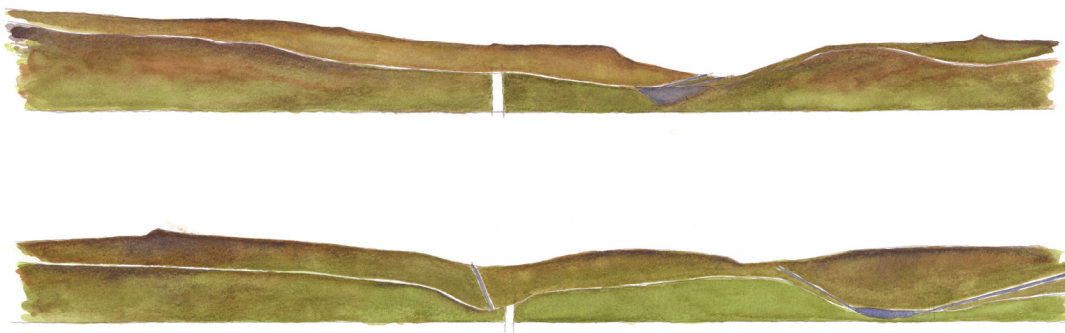


Fig. 4.57 Section through site towards the west; Fig. 4.58 Section through site towards the south

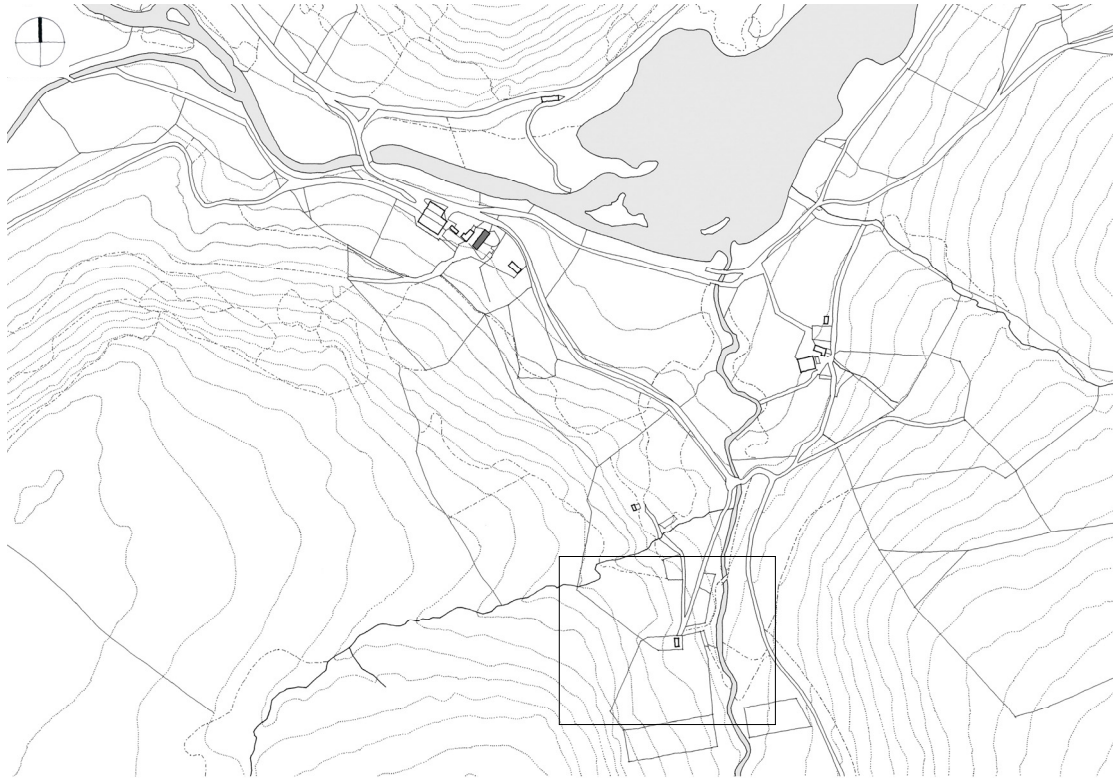


Fig. 4.59 Site in relation to Llannerch Y Cawr Longhouse

The location for the proposed rural dwelling design is on the plot of a derelict house. The site is characteristic of Welsh longhouses, situated midway up the east side of the hill, close to a water supply. However, the existing house is not sited and orientated as a response to the landscape and climate. The house does not correspond to the topography of the landscape as the ground has been levelled out for construction. It makes no attempt to shelter from prevailing winds blowing down the valley or from the north east, apart from very dense trees planted to the south which are not native to Wales. The principle aspect is east facing with views across the valley and there are no openings on the north and south façades. The house is constructed out of red brick and slate and has the appearance of a suburban house.



Fig. 4.60 Site photographs

4.4.4 Design approach and principles

- Response to physical environment

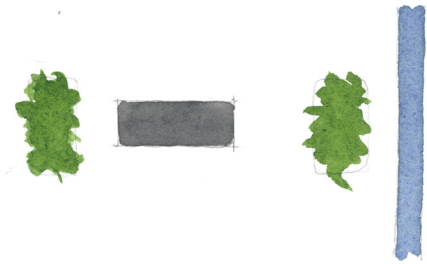


Fig. 4.61 Concept diagram

From the literature and contextual study of the longhouse it can be recognised that the site for the design of the rural house is typical of that of traditional longhouses, in terms of its position, orientation, topography and surrounding resources. The positioning and orientation of the proposed rural dwelling design is characteristic of longhouses on an east – west alignment down the valley. The house is tucked back into the hillside to shelter from prevailing winds as Llannerch y Cawr longhouse is. Trees provide shelter to the west and east, and further from the house to the south.

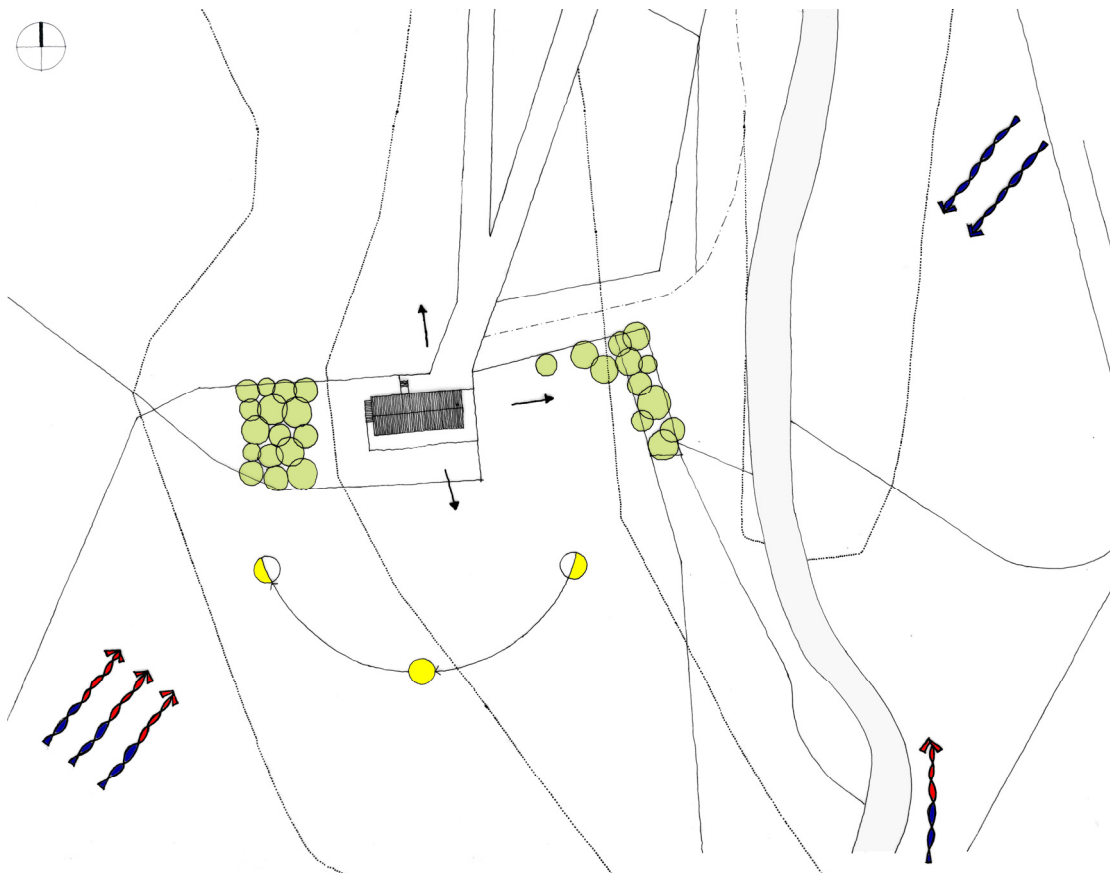


Fig. 4.62 Site analysis 1:2500

The building is sited down the hillside, typical of longhouses, however the living space is towards the lower end of the slope and the bedrooms and study tucked into the hillside. Views of the surrounding landscape have taken precedence over more practical reasons from the past of the cowhouse being positioned down the slope so it could be cleaned out more easily and living space further up the slope for warmth. The primary elevation faces towards the south, where there are views up the valley. There are views also to the east through the trees across the valley and north towards the reservoir.

The form relates to the low, long form, characteristic of Welsh longhouses and is similarly sheltered by the landscape. The design does not follow the longhouse form of thick solid walls built into the landscape to regulate temperatures through thermal mass. Instead a self build approach is taken, without the need for heavy machinery and to be carried out by amateurs and local builders. The house is raised above the ground slightly and 'touches the earth lightly'³⁰ with minimal foundations and without altering the topography of the land. The primary reason for this is so foundations are small and can be laid by hand and to reduce costs. Thermal properties of the ground are not utilised and the house appears less rooted within its context compared to Llannerch y Cawr and Parc Lodge Farm.

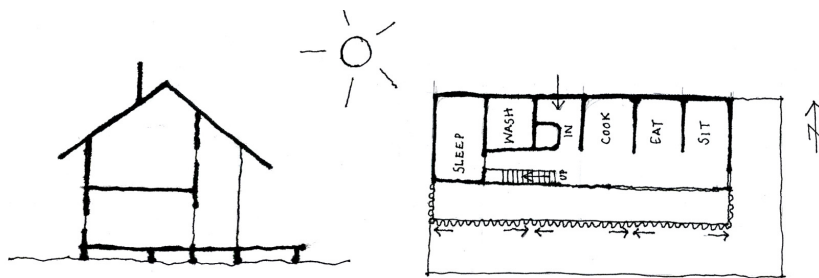


Fig. 4.63 Climatic and spatial concept

The house is organised with the functional activities on the north side of the house to free up the south façade, where there are large openings to maximise passive solar gain. There is an unheated polycarbonate sun space with large openable sliding doors to control ventilation naturally across the house and also act as a buffer to protect the house from winds tunnelled down the valley. The sun space also allows for larger openings on the south façade as the layers of the building envelope are controllable. The heat gain will be transferred and retained in the house by thick concrete paving flags used as floor tiles in the material's thermal mass properties. The walls are highly insulated with 300mm insulation to reduce heat loss. The south facing aspect means vegetables and fruits could be grown in this space.

The orientation works well in principal, in terms of climate having a long glazed south façade, but in reality it could be argued that there are relatively few days of sunshine in this area of

³⁰ Glenn Murcutt, *Glenn Murcutt: University of Washington master studios and lectures* (Seattle: University of Washington Press, 2009)

Wales. The design maximises these few hours of sunshine, through low technology solutions to heat and cool the house.

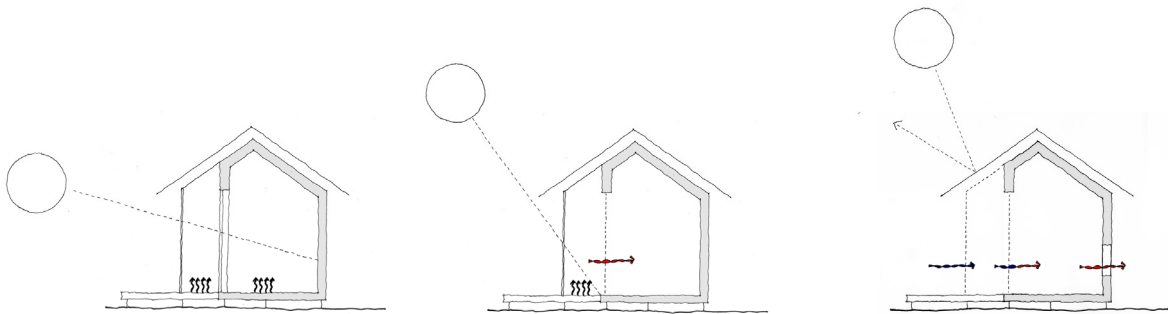


Fig. 4.64 Climatically responsive throughout the year

The roof has overhanging eaves, whereas traditionally the eaves are tight in vernacular buildings in Wales due to strong winds. The overhanging eaves are an alternative response to climatic conditions of the site to keep rainfall away from the building and provide a degree of shading from high summer sun. The sloping roof disperses heavy rainfall away from the building quickly.

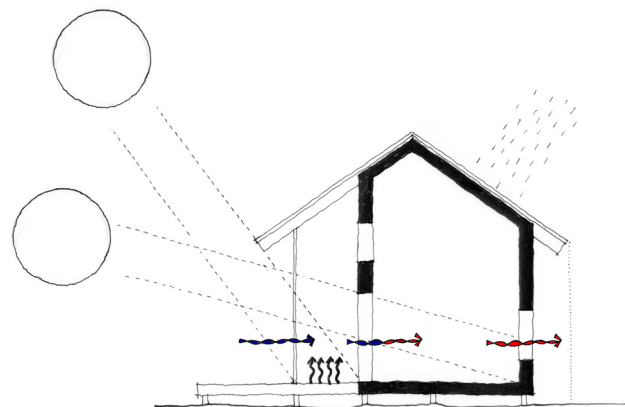


Fig. 4.65 Climatic approach

▪ Simple construction

A design objective is for a simple and straightforward construction, appropriate for self build by amateurs with help from the wider community. The materials chosen are therefore lightweight and designed to be manageable in size. The design is for dry trades and standard construction techniques so only basic DIY skills are required to construct the proposed house design. The foundations are minimal and the building can be repaired and replaced easily by its occupier. These principles are closely related to the approach of Dominic Stevens on construction.

Standardised sizes of materials are used throughout and the structure is built using a standard grid, so there is minimal cutting of materials and minimal wastage. A modular standardised grid of 600mm by 600mm is used as dimensions derived from the width of building panels are

commonly 600mm, 1200mm and 2400mm. Vertical dimensions are controlled by the height of timbers at 2400mm.

The approach builds on Walter Segal's process for self building. The 'Segal method' is simple and economical, making use of readily available, mass-produced modern building materials in flexible design. The simplicity of the method allows amateurs to easily design and build their own homes. The Segal method uses lightweight, standard sized panels such as plasterboard, within a timber framework of posts and beams, which are bolted together. The system was designed to a 600mm grid plus 50mm for the width of walls. Doors and windows could be placed anywhere within this grid allowing for flexibility in the layout and adaptation over time. The building method also uses dry trades, which requires basic DIY skills. As the process does not necessitate the skills of specialists, sub-contractors would not need to be hired other than perhaps a roofer. This keeps the costs down and means the project is less reliant on others. The build can therefore be made to suit the self builders own pace. The houses are built above the ground, which reduces the extent and cost of foundations, and means it is easier to build on sloping sites or poor ground.

The construction system has required development since it was first established due to improved building regulations on u-values. However, the basis of the Segal method demonstrates 'an appropriate vernacular for our time. It is not imposed for stylistic reasons, but uses the basic products of industry and skills that are commonly known and understood. It is essentially an updated version of medieval timber framing.'³¹ The simple approach to construction is appropriate to build on as a continuation of tradition more relevant for today.

Utilising the ideas of the Walter Segal's system and furthering them for today's thermal requirements in building, a spaced (or asymmetrical) stud frame system is adopted. The construction uses two frames, an external structural frame and a secondary one which allows for thick highly insulated walls. It is well suited to self build as the secondary frame can be built later. The spaced studs form a 'thermal break' unlike a conventional stud wall where heat passes through the stud much faster than through the insulation. A greater thickness of insulation can also be used which lowers the u-value of the walls and also produces a more substantial depth of wall. The double frame however makes the construction more complex.

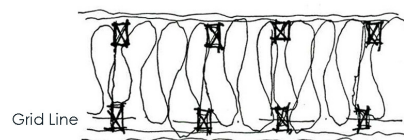
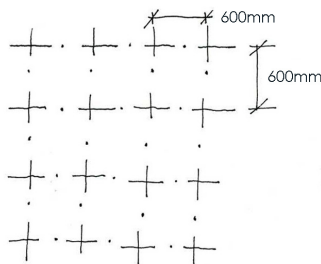


Fig. 4.66 Standardised grid 600mm by 600mm; Fig. 4.67 Asymmetrical stud frame system with high levels of insulation

³¹ Jon Broome, 'The Segal Method', *Architects' Journal*, 183.45 (1986), 31-68 (p.34).

- **Local materials and resources**

An objective for the proposed design is that it is to be constructed out of materials depending on their local availability and ease of obtaining them at a low cost. The ability to obtain locally sourced materials to a site is difficult today due to availability, expense and a lack of appropriate building skills, which prevents this being an option for the design. As a compromise the majority of materials chosen for the design are obtainable from local building suppliers in Rhyader, Llandrindod Wells, Builth Wells or Llanwrtyd Wells approx. 15 miles from the site. Larger building suppliers are found 55 miles away in Hereford. The materials selected are 'off the shelf'. The use of local materials means transport costs are low and materials can be transported by the self-builder. The builder/client can purchase all the materials from just a few suppliers rather than large numbers of different organisations. Purchasing products locally from chains such as B&Q is however supporting big organisations and taking business away from small local firms that offer locally produced materials.

The materials have a low carbon footprint from the suppliers to site, however many of the materials purchased locally have been sourced from all over the world from Brazil, Malaysia, Scandinavia etc. The chain of custody of some of the materials is worldwide. The materials are not necessarily natural either, but have been highly processed and manufactured. Natural materials and more locally sourced products are used where possible before highly processed materials.

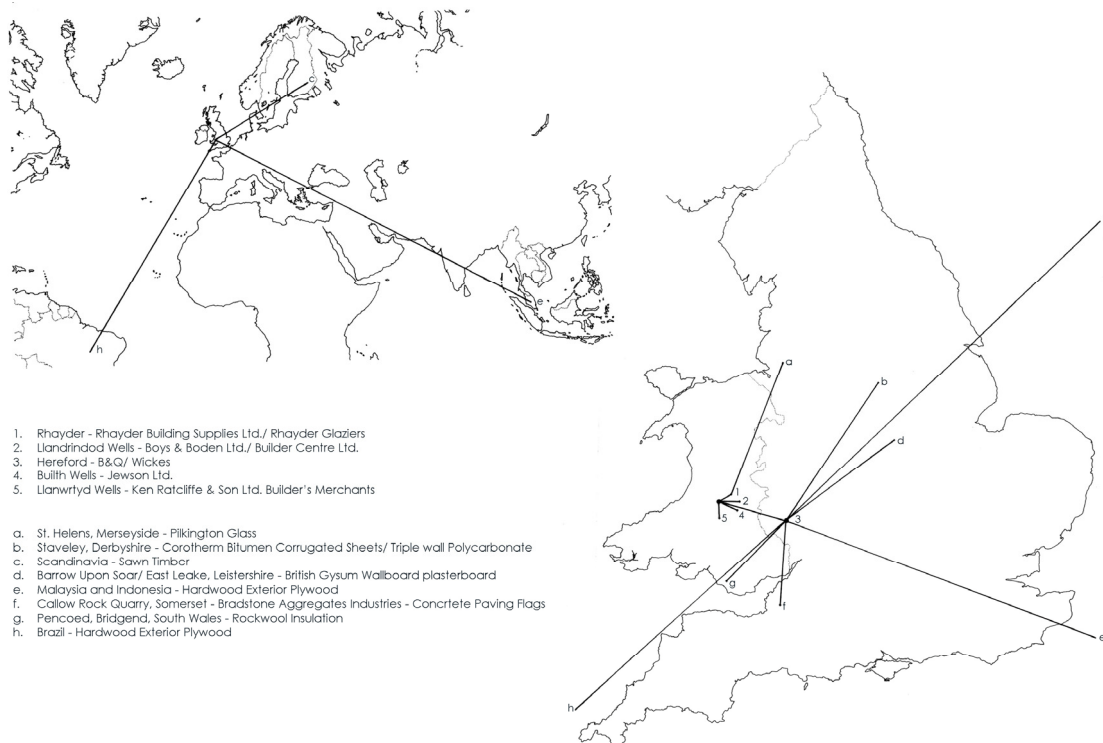


Fig. 4.68 Locally available materials, sourced globally

The basic products specified and the simple building techniques enable local builders or amateurs to be qualified to work on the construction, which supports the local economy.

In attempting to fulfil the design objective to use locally accessible materials at low cost it can be seen that many concessions had to be made. Despite the materials being obtained within relatively close proximity to the site, the materials do not relate or hold any connection to the landscape of the place.

▪ **Economics**

A primary objective of the design was for it to be economical and affordable. Inexpensive mass produced modern building materials that can be purchased from local building merchants reducing transport costs are chosen. Costs are reduced as the design can be self built. The form is straightforward using standard building sizes and repetition of elements so wastage is minimal. The size of the dwelling is compact and space is designed efficiently. The building can effectively be adapted and added to easily in the future. The materials require no specialist building skills to assemble and could be used for construction by amateurs or local builders trained in basic skills.

A range of inexpensive building materials available from local hardware stores and building merchants is collated and compared for their suitability to the design economically, in terms of buildability and sustainability. There is also an issue of durability as many affordable materials do not tend to have a particularly long lifespan. The materials chosen for the cladding are marine plywood and polycarbonate which may not be very durable in the harsh climate of mid Wales. They will therefore have to be replaced fairly often which may not be as economical as originally considered. It is possible for more durable and expensive cladding materials to be added in the future and there is an opportunity for the client to use different materials depending on budget or personal preference.

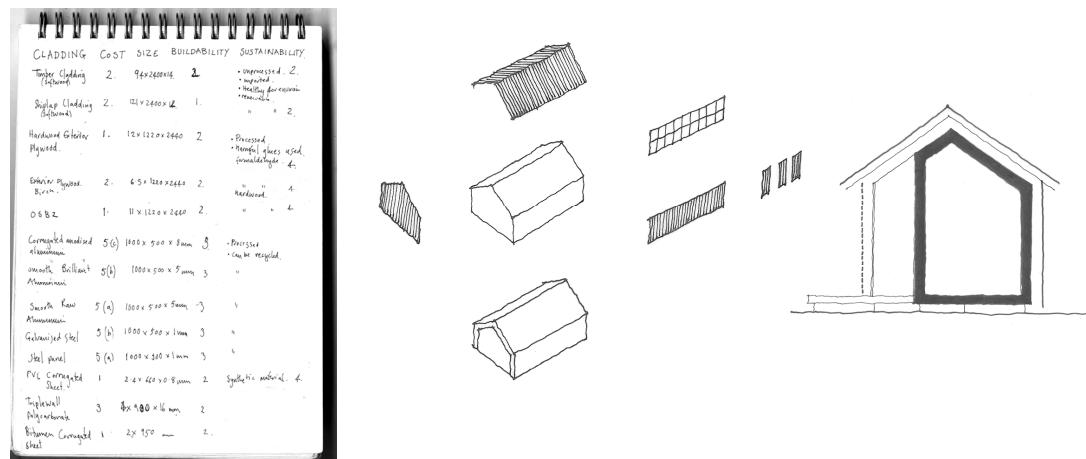


Fig. 4.69 Analysis of building materials available in terms of cost, size, buildability and sustainability; Fig. 4.70 Concept sketch of replaceable cladding materials

Following this approach is affordable and convenient for self builders, but the choice of materials available is limited and often very unsustainable.

The products were valued from B&Q and Wickes price list 2009/10.

Product	Colour	Size	Price	Description
EXTERNAL WALLS				
Hardwood Exterior Plywood		1220 x 607 x 18mm 2440 x 1220 x 18mm	£19.70 (£26.63 per sqm) £35.75 (£12.00 per sqm)	Extremely versatile. When treated can be used externally and internally when painted.
Preservative Treated Sawn Construction Timber		3600 x 38 x 19mm	£1.07	
Triplewall Polycarbonate Sheet	Clear	3000 x 980 x 16mm 4000 x 900 x 16mm	£79.99 (£20 per sq m) £61.29	Effective thermal insulation, high strength, lightweight, light transmission, resistant to yellowing.
INTERNAL WALLS + PARTITIONS				
Gyproc Wallboard Plasterboard	White	2400 x 1200 x 12.5mm	£6.67	
Sawn kiln dried timber		2400 x 75 x 47mm	£3.48	
ROOF				
Bitumen Corrugated Sheet	Black	2000 x 950mm	£11.23 (£5.62 per m)	Roofing garages, carports and sheds. BBA Standard, sheet cannot delaminate.
INSULATION				
RockWool Insulation		3200 x 600 x 150mm 3200 x 1200 x 150mm		
FLOOR FINISH				
Concrete Paving Flags	Grey	600 x 600x 50mm	£5.10 for 20	

Fig. 4.71 List of building materials used in the design obtainable from local building suppliers

The total building costs for the construction is just under £100,000, taking prices of materials from local DIY stores including Wickes and B&Q and also average pricing from Spons 2010 Building Estimates.

Schedule of Works	Size of material	Cost of quantity	Cost per m2 £	Area	Total quantity	Total cost of quantity
Gross floor area				170.6		
Net useable floor area				107.7		
Gross External wall area						
Net external wall area						
Window/ door area				28.35		
Roof area				161.5		
Substructure						
Pile Foundations			£40	170.6		£6,800
sub-total						£6,800
Superstructure						
Spaced Stud frame			£70	260.1		£18,200
Pitched Roof - softwood trusses at 600 centres			£42	170.6		£7,140
300mm Rockwool			£10.44	80.9		£845
Stairs						£1,790
sub-total						£27,935
External finishes						
300mm Rockwool			£10.44	194.16		£2,027
Hardwood Exterior Plywood cladding	2440 x 1220 x 18mm	£35.75	£12.00	230.55m ²	63	£2,252
Bitumen Corrugated Sheet	2000 x 950mm	£11.79	£5.90 per m	29.78m ²	18	£212
Triplewall Polycarbonate Sheet	4000 x 900 x 16mm	£61.29		77.71m ²	22	£1,348
sub-total						£5,839
Roof finish						
Bitumen Corrugated Sheet	2000 x 950mm	£11.79	£5.90 per m	161.5m ²	95	£1,120
sub-total						£1,120
External openings						
Double glazed Aluminium windows			£290	11.51		£3,457
External hardwood solid timber door		£500			1	£500
Glazed Doors		£3800 + £1000			2	£4,800
sub-total						£8,757
Internal finishes						
Doors		£35.98			6	£216
Ground floor finish (concrete paving flags)					(240) 12 packs	£61
Internal stud partitions faced with 12.5 thick plasterboard + skim coat plaster	600 x 600 x 50mm	£5.10 for 20				£5,400
First floor finish (plywood tongue and groove)			£72	75		£1,493
Ceiling finish			£34	43.92		£890
sub-total						£8,060
Fitting and furnishings						
Sanitaryware						£4,000
Kitchen/ kitchenette						£5,000
sub-total						£9,000
Services						
MVHR heating system						£10,000
Design, ductwork, silencers, installation etc						£4,000
Hot water system						£3,860
Electrical/ Data system						£5,280
Below ground drainage						£2,000
sub-total						£27,140
External works						
Hard landscaping						£1,980
Level threshold drainage						£1,320
Planting						£660
sub-total						£3,960
BUILDING WORKS TOTAL						£98,611

Fig. 4.72 Total build costs

- **Function and Flexibility**

The final principle for the design is for it to be functional and flexible. This is considered in terms of spatiality, construction, environmental and comfort factors. The house can function as a 3 bed house or a 2 bed house and accommodate a home office on the ground floor. There is also opportunity to create a fourth bedroom by extending the upper floor over the living space if necessary. Space beneath the house can be used to accommodate a place for recycling household waste, recycling grey water and bicycle storage.

The timber stud frame system allows for flexibility and change in the building and the modular grid allows the building to be extended easily in the future to suit the occupiers changing needs. Fittings and pipes etc. can be easily adjusted and are contained within the frame.

The sun space on the south façade allows for flexibility in both winter and summer. The large polycarbonate sliding doors and internal folding doors can both be opened to ventilate the house and sun space or closed to keep the house warm. It allows high levels of light to enter the house without large amounts of heat loss. It enables the relationship with the outdoors to be changed depending on the weather conditions and the spaces can be inhabited differently. It also gives the user the ease to vary temperature and comfort through a number of openable doors and windows. It can be closed off to make the space more intimate or opened to provide a closer relationship to the outside. The sun space is quite narrow but is wide enough to sit in and shelter from the weather. The sun space can be used for a number of activities such as sitting and relaxing, growing food and drying clothes.



Fig. 4.73 South façade closed up in cold weather in winter and opened in warm weather in summer

4.4.5 Final design

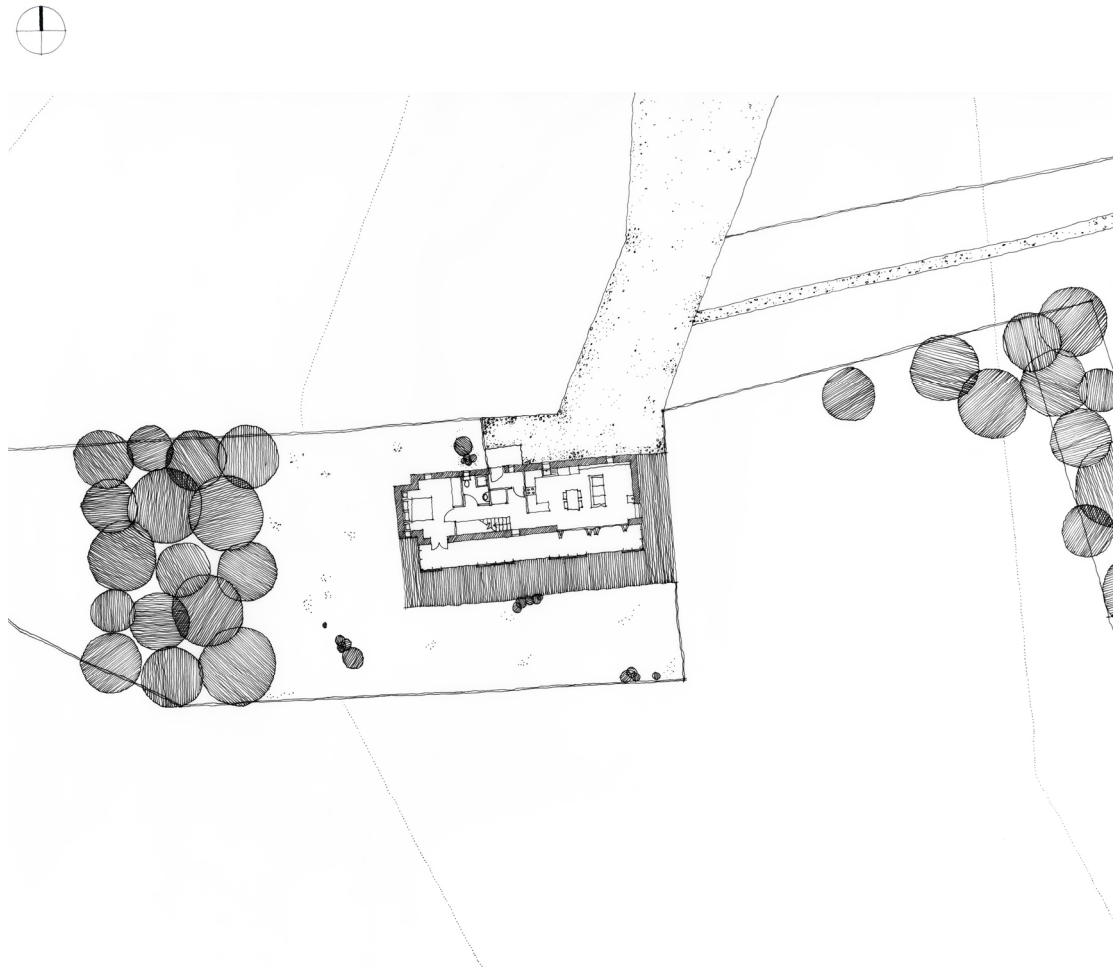


Fig. 4.73 Site plan 1:1000

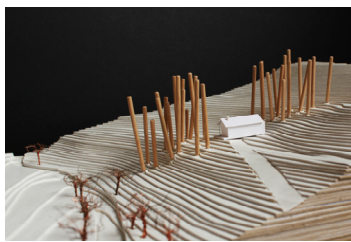
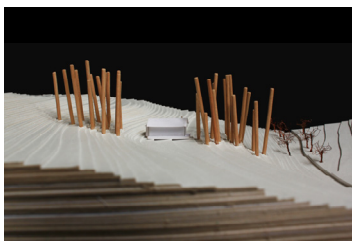


Fig. 4.74 Site model

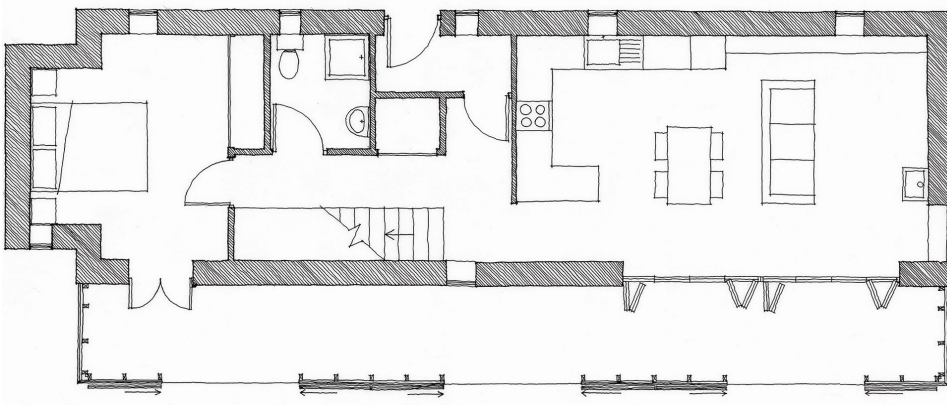
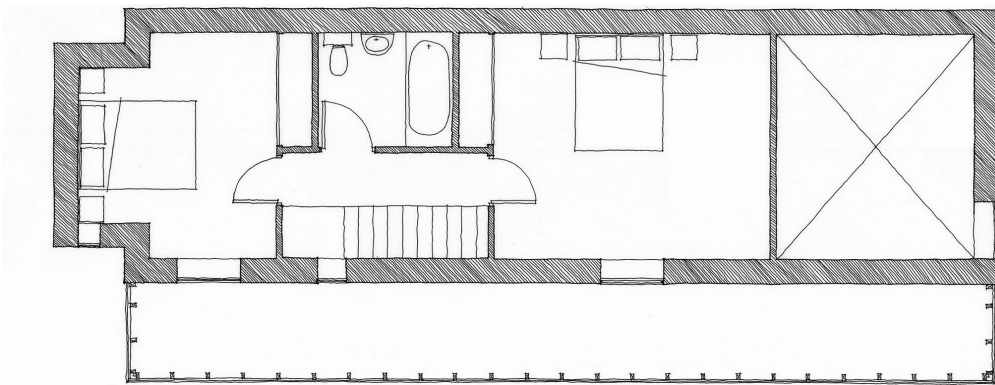


Fig. 4.75 Upper and lower floor plan



Fig. 4.76 Section through kitchen and bedroom 1:200



Fig. 4.77 North elevation 1:500



Fig. 4.78 South elevation 1:500

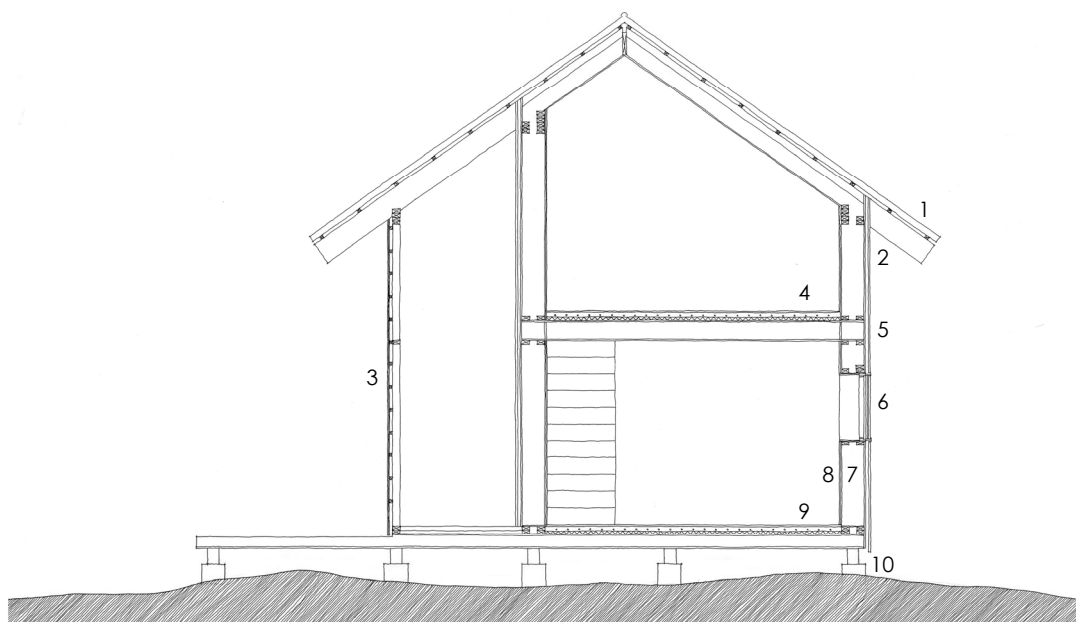


Fig. 4.79 Construction section 1:100

- 1 Black bitumen corrugated roofing
- 2 Exterior plywood cladding
- 3 Triple wall polycarbonate cladding
- 4 Timber floor boarding
- 5 Asymmetrical stud frame
- 6 Double glazed aluminium window
- 7 Rockwool insulation
- 8 Plasterboard
- 9 Concrete paving slabs (polished)
- 10 Pile foundations



Fig. 4.80 Model showing the construction and material finishes, in addition to the spatial layout and setting out of standard sized materials



Fig. 4.81 Model showing the form and material finish of the dwelling design



Fig. 4.82 View from the north-east in context of the site

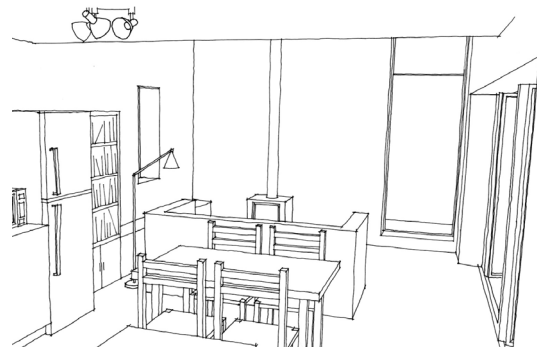
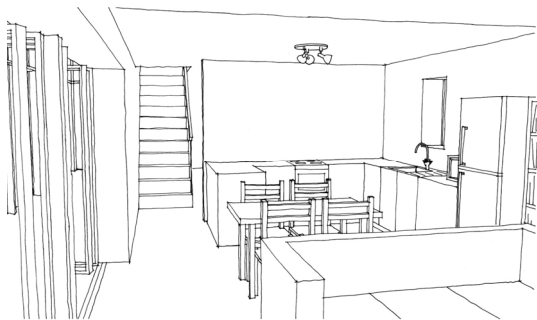


Fig. 4.83 Interior sketches showing inhabitation of the main living space

4.5 Review, analysis and reflection

4.5.1 Introduction

On reflection, a number of findings can be drawn from the model as an 'entity' and also in the 'process' in which it was implemented in this pilot study, which relied on a fairly literal interpretation of the Rapoport's model. The design outcomes produced from established principles in the model are firstly reflected on in a design review. The findings are developed through 'reflection in action' in the design process and in 'reflection on action' in critiques and design reviews with professionals and peers in the field. Simon Unwin was principally involved in the process of 'reflection on action', providing guidance and expertise on key principles of vernacular architecture, design and the process of the research. The design review was carried out with reference and analysis to commentary made by critics including Simon Unwin and it also involved cross-examination with observations made in literature and examples of best practice. Each 'principle' which was applied and 'tested' in the design was analysed and the findings for each are set out below. The application of the model in the pilot study is then summarised in the findings, to determine whether the method undertaken was an effective means to test Amos Rapoport's model. This was carried out in order to draw conclusions from the results to inform and modify the model for the following design studies.

The outcomes of the model as an entity are analysed below, through the principles established in the model.

4.5.1 Design review through principles

▪ Response to physical environment

The design proposal was sited on the position of a former dwelling, as the site was identified as typical of longhouses. However on reflection, alternative locations within the vicinity of the site should have been considered, as it was not necessarily the optimal location for a dwelling today, despite it being characteristic of siting of longhouses, in terms of the topography and orientation. Dean Hawkes states that:

In any terrain the significant moments occur where there is a change in state. Where flat becomes slope, meadow becomes coppice and, a particularly potent condition, where land meets water. In the rich legacy of building in the landscape that is found in the vernacular tradition these moments of transition are often marked by buildings and, through this, we acquire a deeper understanding of our relationship with nature. Building becomes a kind of measure of the essential character of place.³²

The proposed positioning of the building in the landscape is isolated and the form is not grounded to any existing markers of the place, as Dean Hawkes suggests is so critical. When the existing derelict house was built, the ground was levelled out and non-native trees planted,

³² Dean Hawkes, 'Necessity and Poetry: David Lea's Bridge Pottery', *Architectural Review Quarterly*, 6.1 (2002), 131-139 (p.131).

appearing out of scale in the setting. The new design proposes to reinstate the sloping ground of the site. However the form of the new dwelling is raised above the land and doesn't relate to the topography.



Fig. 4.84 Ty Mawr, Wybrnant a traditional stone built 16th century upland farmhouse in north Wales is sited next to a stream and is set within a traditionally managed woodland landscape

The proposal therefore does not appear rooted in its place, despite following practical considerations and knowledge of orientation and siting of longhouses. The design does not consider the relationship between built and un-built space of the immediate surroundings and it's possible uses. The settings of vernacular dwellings such as Kennixton at St Fagans are often defined by a distinct territory, which gives structure to the landscape, through interventions such as fields, walls, routes and enclosures. The proposed dwelling design however appears as an isolated object in space and the form does not extend outwards to connect with the surrounding markers of the landscape.



Fig. 4.85 Stone walls enclose the garden and define territory at Kennixton farmhouse, St Fagans

David Leatherbarrow reiterates the significance of the connection between landscape and building, he states that:

the building is not substantial on its own terms, nor self-sufficient, but contingent, dependent, or adjective to its milieu. While still managing its own affairs, site construction (landscape architecture's most basic pretext) is now used also to *determine* the building's overall massing and discrete settings, as if it were *structure*, not only binding the two together, but making the second—the building—an attribute of the first. The idea of adjectival architecture extends a commonplace of contemporary criticism, that the site should "structure" the project.³³

The dwelling design is sited perpendicular to the contours of the land, as longhouses were built, but rejects the traditional longhouse form of thick, solid walls stepping down in the landscape, utilising thermal mass of the ground. Alternately, an approach was adopted that allowed the house to be built without the use of heavy machinery and constructed by amateurs and local builders, predominantly using dry trades. This provides the argument for the house touching the ground lightly with minimal foundations. However, this has resulted in the dwelling not appearing to be rooted to its place, as the house projects out on a platform into the landscape. It is not 'structured' by or part of the landscape, which David Leatherbarrow reiterates is critical to architecture.

In addition to the design of the dwelling requiring consideration in relation to the surrounding territory and environment, the internal space within the form could also be further influenced by aspects of the wider landscape in the creation of places within the house. David Leatherbarrow explains the significance of phenomenological experiences created through a building's relationship with the landscape and the internal connection with outside. He argues that 'site—or, more broadly, ambient landscape—is not what surrounds and supplements the building, but what enters into, continues through, emanates from, and enlivens it'.³⁴ Influence of climate and orientation in the design takes priority over this. Practical considerations of landscape and climate are adopted through passive design, of wrapping up warm and facing the sun, over addressing the senses in terms of lighting variations, ambience and views out into the landscape. The study demonstrates that it remains important to take advantage of climatic considerations of site, but improved efficiency and effectiveness of materials means that there is less need for the form and siting to be driven principally by climate and orientation. This allows a greater emphasis on the connection between the physical environment and placemaking in design, through experiential means.

▪ **Simple construction**

The design of a simple construction method was considered essential in order to enable amateurs, with limited skills and knowledge, to build the dwelling using standard construction techniques. The approach builds on Walter Segal's method for self building. However the system has required development since it was designed, due to improved building regulations and lower U-value targets. Through analysis of construction types it was decided that an asymmetrical stud frame system would be employed in the design. The construction uses two

³³ David Leatherbarrow, *Topographical Stories: Studies in Landscape and Architecture* (Philadelphia, Pennsylvania: University of Pennsylvania Press, 2004), p.21.

³⁴ *Ibid.*, p.21.

interconnected stud frames, an external structural frame and a secondary stud. This allows the cavity to be filled entirely with insulation, significantly reducing thermal bridging within the wall construction compared to the original Segal method of construction. A U-value of 0.1W/m²k can be achieved with 300mm thick walls. It is well suited to self build as the secondary frame can be built later. The double frame however, makes the construction more complex and requires a much greater quantity of timber to construct the frame. The thick walls created by the two timber frames in the design, create a substantial structure. However it is far from the simple, monolithic walls of longhouses.

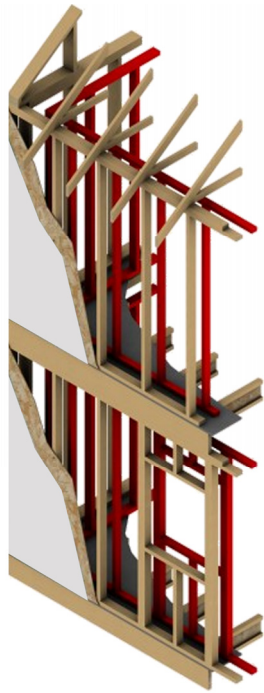


Fig. 4.86 Complexity of asymmetrical stud frame system

The design highlights an inability to build simply with off the shelf materials, which is made more difficult with today's energy requirements. In an attempt to achieve low U-values and due to a limited range of insulation types available, the two framed system was determined to realise these aims. It has however resulted in a less simple and straightforward construction. Multiple elements make up the structure in a complex layering of materials. 'Today the expression of truth in an external wall invites complex negotiations with structural and thermal requirements; waterproofing, damp-proofing, cold bridging, U-values; an assemblage of hidden and exposed layers, metal and plastic ties, vents, supports, connections.'³⁵ The basic building elements obtainable from local suppliers can only perform single functions to construction as opposed to the properties of materials such as stone that provide structural, waterproofing and insulating properties within the one material. The principle to design simply therefore proved much more complex to achieve than initially expected. It was also difficult to accomplish a simple construction alongside other principles set out in the design, which caused conflicts with building simply.

³⁵ Mhairi McVicar, 'Memory and progress: confessions in a flagstone wall' *Architectural Research Quarterly* 11.3/4 (2007), p.204.

- **Local materials and resources**

The design was considered so a local workforce and readily available materials could be utilised in the construction, comparable to how traditional longhouses were built. It was realised that the materials available for construction today however have changed. The use of local stone is now redundant because quarries have closed and builders' skills are applicable to new construction techniques. In addition there are issues with time constraints and cost of labour, which were much less significant to vernacular builders. The method of building with stone was developed and repeatedly adopted to become a tradition of longhouses because of 'constraint' determining the decision rather than choice.³⁶ Stone has now become an expensive product with limited availability. The resources identified for construction in this project were driven by constraints that they must be purchased locally, be affordable and be able to be handled by a self builder. This was fulfilled, but at the expense of some of the materials being sourced and imported from across the world, despite being purchased locally. The majority of materials obtainable from local building merchants were primarily either manufactured or processed and a number of them lack robustness. The materials determined for use in the construction, however are not very sustainable, despite being locally available. It highlights the difficulty of obtaining sustainable and natural materials at low cost. It also emphasises that identifying suppliers of locally sourced and manufactured products is much more complex and time consuming compared to purchasing everything from a single building supplier. This principle is central to the vernacular as building has developed through traditions in order to make ways of living easier.



Fig. 4.87 Palette of materials specified for the proposed design

The use of predominately manufactured or processed materials and the unavailability of natural resources have resulted in little direct connection with landscape and time through the textural qualities. Richard Weston explains how 'natural materials have time inscribed in their very structure – from decades or centuries it takes to produce timber, to the untold millennia of sedimentation, geological transformations and weathering locked in stone.'³⁷ Similarly Juhani Pallasmaa discusses how the textural qualities of materials 'connects us with time and tradition: through impressions of touch we share the hands of countless generations.'³⁸ The weathered

³⁶ Simon Bronner, 'Building tradition: Control and authority in vernacular architecture' in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, e.d. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006), pp.23-45 (p.26).

³⁷ Richard Weston, *Material, Form and Architecture* (London: Laurence King, 2003), p.123.

³⁸ Juhani Pallasmaa, *The Eyes of the Skin: Architecture and the Senses* (Chichester: John Wiley & Sons Ltd., 2005), p. 56.

quality and texture of natural and untreated materials of longhouses, is difficult to acquire in new materials today.



Fig. 4.88 Textural quality of traditional materials

The quality and durability of materials chosen for the design may not be resilient enough to withstand the harsh climate of the site and may deteriorate and weather within a short period of time, resulting in the need for regular maintenance and replacement. Richard Weston describes that climate and time are the 'two great modifiers of buildings'³⁹ and that 'modern buildings ask to be disassembled or re-clad rather than gradually remodelled, with obvious implications both for use of resources and for the continuity'⁴⁰. In the proposed design, old and deteriorating materials would be replaced with new ones in time, perhaps with more durable finishes. This approach means the building will revert back to a renewed form rather than continuing to evolve in time. More technologically advanced materials manufactured and tested to improve resistance against wear and aging are not available at low cost at general building suppliers. They can only be obtained from specialist suppliers, with the need for professional installation. This principle therefore highlights that it is difficult to acquire heavy duty and long lasting materials, which display the textural qualities of natural resources, solely from a local building suppliers and at low cost.

▪ Economics

The design is relatively economical and affordable to build, costing less than £100,000 for approx. 120m² accommodation. The materials used in the construction are inexpensive, but the insubstantial nature of some of the materials means they would have to be replaced in time, adding to the costs of maintenance in the future. The standard sized building materials and grid is efficient and economical to the design.

In comparison, Dominic Stevens completed a 3 bed house in Ireland for just over 25,000 Euros (approx. £21,000) in 2011. The house is much more compact, less than 100m² and is specified at a much more basic level. It highlights that the design could be more compact, particularly in the sleeping areas and it questions whether the polycarbonate sun space is the most economical and functional use of space.

³⁹ Weston, p.118.

⁴⁰ Ibid., p.119.

The cost difference between the two houses shows that there could be opportunity for value engineering on elements of the design. Dominic Stevens' house is a less permanent home, or at least it may need extending in the future as the family grows. In comparison, the design for the house in Wales is too costly to be considered a temporary solution to housing needs. However the materials are not durable enough for the house to have a long lifespan, without the need to renew elements of it in time. This aspect of the design demonstrates a need for a more defined brief and target costs.

- **Function and flexibility**

The design is flexible and functional spatially and to a degree in the construction, as it could be easily adapted and changed. The timber stud frame system allows for flexibility and change within the building and would enable it to be extended easily. Fittings and fixtures etc. could be easily adjusted as the building is designed to be built using dry trades only.

The sun space on the south façade allows for flexibility of living in both winter and summer. It can be closed off to make the space more intimate or opened to the outside. It gives the user the ease to vary temperature and comfort through a number of doors and windows. The sun space is quite narrow, but is wide enough to sit in and shelter from the weather and for use of drying clothing and growing plants. The windows out onto the sun space may not be very effective as the polycarbonate would allow light through, but obscure the views out to the landscape. More consideration is required in the design in terms of how the house may be inhabited and functions within it carried out.



Fig. 4.89 Final piece to summarise the findings of this design – 'touches the ground lightly', standard grid construction system to be built by amateurs, materials locally obtainable from a local building suppliers, economic, ordered and functional

4.5.3 Findings

The research highlighted a number of findings relating to the model as an entity through outcomes of the design study which are discussed above. In addition there are findings that can be drawn from the processes of the research through the use of the model. These findings will analyse how the design was conducted as a method for the research with reference to the product of the model. They are reviewed below:

The pilot study showed the value of developing a wide understanding of tradition in preliminary studies of the longhouse, which were analysed to draw out principles for design. It was recognised that this should be carried out through various means, but most crucially through personal observation, drawing and experiencing a place. There is also benefit in being aware of how contemporary architects have applied tradition and innovation to design. The case study examples highlight the diverse range of approaches, specific and relevant to different situations and circumstances. It reveals the difficulty in defining a suitable approach due to a great degree of choice available in comparison to the case studies of tradition which show much closer similarities. This substantiates the value of establishing an effective model in providing guidance and direction for design, where site and brief are quite open.

The contemporary case study examples show how the architects and designers of the projects place great significance on siting, climate and orientation, alongside materials and construction in their architecture. These principles are correspondingly identified towards the base of the hierarchy of needs reworked from Maslow's hierarchy to represent the longhouse. The needs towards the top of the hierarchy are less identifiable in the contemporary precedent as in the examples of traditional longhouses. This confirmed that an approach to defining principles from the most influential and necessary elements of tradition is an adequate method to take as examples of best practice appear to be most influenced by these fundamental aspects of tradition. Specifically in Dominic Stevens's house in Ireland, there is considerably more reference in publications to social aspects of how the home is inhabited and able to adapt to occupiers needs. These issues however have much less prominence in the other designs. As the house in Cloone is designed by and for the architect himself, concerns of use, intimacy and human factors affecting design are much stronger, which are found higher up the hierarchy.

In hindsight, it is recognised that there is a need for a better functional brief and a client to help define some of the intricacies and specific needs of a user. Employing someone to act as a client for the design studies could help formulate a more realistic brief and provide guidance for costing. A site with the potential to be developed proved to be important to the model, so that a practical proposal could be envisaged.

In reviewing the design it became apparent that some of the principles were driven too explicitly and followed too strictly. The principles were implemented in isolation of one another, which resulted in conflicts in the overall outcomes. It revealed how principles of design are interconnected in various ways, so should not be considered apart from one another. For example the design was driven to be economical, but this was at the expense of the materials not being very durable. This was restricted by opting to purchase materials from local building suppliers, which gave no regard to whether materials were sourced or produced locally. The design outcomes could have been more successful if the principles had been integrated to a greater degree throughout the design process and a more compromising and flexible approach taken. It highlights the need to use the principles as a guide and that the principles encompass many different elements within them. The application of principles in the model has given the design a direction and has resulted in some interesting design choices that may not have been decided upon naturally. It has also demonstrated the complexities and various approaches to principles of the vernacular that can be adopted in design today.

The research shows that despite the principles being based on concepts that shaped longhouses, the emphasis of the principles has changed from the past. For example, traditionally there was a necessity to build simply with the technologies which were available, whereas in this project it is an aspiration to achieve architectural clarity and simplicity, in order for amateurs to be able to construct their own dwellings, as well as for aesthetic reasons. In contrast to the past, the design attempts to simplify the complexities of our knowledge, technologies and greater requirements, as opposed to building simply through necessity. Therefore the relevancy and emphasis of principles adopted require modification from tradition to remain appropriate to current design.

Through research by design, theories and ideas from literature and case study examples were tested in a practical application, which uncovered issues which may not have been identified in theory based research alone. The design proved that in order to test the principles from the model it is critical to investigate ideas from a conceptual level to detailed design in a range of means including diagrams, sketches, drawings and model making.

In the review process external critic Simon Unwin proved essential in highlighting elements of the process that had been overlooked as a result of being too involved in the study and to provide additional knowledge and an alternative viewpoint. However it was recognised that a client would have been valuable to work with throughout the design process to interrogate and drive the design in a direction, particular to a user's needs and in relation to other practical considerations such as cost. On reflection, it was useful to compare the outcomes of design retrospectively with the initial studies and literature review, in addition to relating it to on going research. This enabled an analysis of what was successful, missing or could be improved in the design process.

The pilot study therefore demonstrates that research by design can provide a method in which to test Rapoport's model in the context of architectural design. The model will be adopted in successive studies in a similar way, but refined where necessary to overcome issues identified in the pilot study that affect the success of the research. Principally, a more defined brief will be set out and a client used to provide greater pragmatism and clarity to the study, using the principles as a guide to design.

A number of further decisions were determined from the pilot study, including how many design studies could be carried out in the timescale of the research and how many would provide sufficient results. The pilot study determined that only a limited number of designs could be undertaken in the time, but a range of iterations would be required to continue developing the model to then be tested in one main study. A series of studies to encompass main housing types was identified as appropriate to explore so that it could be tested how the model could apply to different housing needs. Leading on from the rural dwelling study involving the longhouse tradition, the following studies will consider live work, the terrace and an edge of settlement development in the concluding study. These are determined from the literature and a housing need.

5.0 Live work

5.1 Introduction

This second design study is focused on live work and is based on traditions of the cottage typology in Wales. There is a relevancy in studying this type for the contemporary, as there is demand for live work units due to increased popularity of home based working. Traditionally work throughout Wales tended to be home-based and at a subsistence level up until the industrial revolution and basic necessities were produced and sold from the home or at local markets. Francis Holliss identifies that 'the building type that combines dwelling and workplace has existed for hundreds, if not thousands, of years. It can be traced from medieval longhouse, through proto-industrial weaver's house and nineteenth century artist's house to the contemporary 'live/work' units.'¹

There is value in researching the traditions surrounding workplace dwellings of the past in relation to the way the typology exists today, as there has been a move back towards live work, with improvements in technologies, communication and more diverse and flexible working patterns. It is estimated that '25% of the UK working population now lives at their workplace or works at or from home for at least one day a week.'² Holliss describes live/work as a 'popular, family-friendly, environmentally sustainable working practice that is good for the economy and contributes to the creation of busier and therefore livelier, safer and more cohesive neighbourhoods'³. It allows greater flexibility with regard to childcare and allows the elderly, sick and disabled to continue working. Without having to commute, working from home saves on time, travel expenses and cuts down on carbon emissions. Buildings that are not specifically designed as dual use however can cause disturbance, inefficiency and stress. Working at home can make people socially isolated if the right amenities are not nearby. It therefore seems a significant typology to study in relation to living and working habits today and provides a greater focus on the study of the traditional cottage typology.

Traditions of the cottage are the focus of this study as the type has accommodated a place for work in various forms over time, alongside functioning as a dwelling. Cottages are described by Iorwerth Peate⁴ and Eurwyn Wiliam⁵ as representative of the vernacular of Wales, in addition to farmhouses. Cottages were the homes of people who did not own enough land to live off and the people who lived in cottages were usually farm servants, craftsmen or quarrymen. It has been observed, but infrequently acknowledged that the cottagers were often 'masons and carpenters, weavers and stocking-makers, cobblers and clogmakers, and

¹ Frances Holliss, 'Beyond live/work', *Planning in London*, 67 (2008), 22-24
<<http://www.planninginlondon.com/assets/PIL67%20UPLOADS/Holliss%20final%20pages%20pil67.pdf>>
[accessed 28 July 2010] (p.22).

² Ibid., p.22.

³ Ibid., p.22.

⁴ Iorwerth Peate, *The Welsh House: A Study in Folk Culture* (Burnham on Sea: Llanerch Press, 2004), p.3.

⁵ Eurwyn Wiliam, *The Historical Farm Buildings of Wales* (Edinburgh: John Donald, 1986), p.16 and p.36.

other craftsmen who made an essential contribution to the local economy'⁶, living and working from their dwellings. The study also considers the development of cottage crafts into craft industries in the form of weavers' shops, purpose built as a workplace and home for employees during the industrial revolution.

Frances Holliss identifies in an essay *From Longhouse to Live/Work Unit*, that there is no recognised literature on buildings that accommodate both live and work functions. There is only reference in articles on dwellings or workplaces in isolation of each other, and dual-use buildings have not been identified as a classified building 'type'⁷, despite existing in various forms throughout history up to the present. This is true in Welsh literature and there appears to be a lack of research specifically in traditions of this typology. Studies in Welsh crafts often acknowledge that many of them were carried out in cottages and farmhouses, but without explanation of how the activities were executed within the buildings and the conditions in which the craftsmen worked alongside living. In the same way, literature about the cottage type rarely mentions craftsmanship practiced within them. Holliss argues that the lack of research into buildings with more than one function is because throughout history buildings have been classed and cross-examined according to their predominant function, resulting in their dual-use often being disregarded or overlooked.⁸ Holliss refers to Swedish botanist Carl Linnaeus' understanding of the system of classification. He states 'if you do not know the name of things, the Knowledge is lost'⁹. Holliss considers this has been the case with buildings of more than one use. The literature review of traditions of the Welsh House identified that buildings have primarily been categorised into specific housing types, of which live work is not identified. Research in workplace dwellings will therefore involve a wider review of literature to study building form and work related crafts separately. This will involve study of literature on vernacular architecture and folklore. The two functional aspects of living and working will be drawn together and discussed.

⁶ Richard Suggett and Greg Stevenson, *Introducing Houses of the Welsh Countryside* (Talbot: Y Lolfa, 2010), pp.164-165.

⁷ Frances Holliss, 'From Longhouse to Live/Work Unit: Parallel Histories and Absent Narratives' in *Built from Below: British Architecture and the Vernacular*, ed. By Peter Guillery (Oxon: Routledge, 2011), pp.189-207 (p.189).

⁸ *Ibid.*, p.190.

⁹ Carl von Linne, *Linnaeus' Philosophia Botanica*, trans. Stephen Freer (Oxford: Oxford University Press, 2005), p.158.

5.2 Literature and contextual study

5.2.1 Tradition of live work

Throughout Wales, until fairly recently, rural communities were self-sufficient, producing a great range of products and produce they required to live. Much of this making took place in the dwellings or workshops adjoining their homes. Buildings that functioned as a dwelling and a place of work were often named 'house' with subsets, such as long-house, bake-house and ale-house. 'House' was used to describe 'a building for any purpose', whereas today the term is seen as a building where people live, primarily as a place to eat, sleep, wash and relax, and people tend to travel to work, rather than work from home.¹⁰ Most work related activities of traditional workplace dwellings happened in or besides the house and without acquiring a specific classification or name they have therefore lost significance.

The longhouse studied in the previous chapter is an example of a workplace dwelling as people lived under the same roof as the cow house and dairy, their places of work. Longhouses accommodated a number of other activities and crafts which would have been carried out when the cattle didn't need tending to, including cooking, cheese making, spinning and weaving, and producing many essential objects. These subsidiary activities are infrequently discussed in relation to the longhouse. The main halls of longhouses have been associated with contemporary live/work spaces as they comprise of a double-height space with a mezzanine or sleeping platform above.¹¹ On a smaller scale cottages similarly function in this way, with living and working occurring in the primary space open to the roof with a crogloff for sleeping to one end of this space.

Within cottages and farmhouses a great range of working activities took place. Together, a community could provide all the food and provisions required. Farmers and countrymen with animals supplied milk, meat, skins and wools and those with fields and gardens provided fruit and vegetables, cereals and root crops. The skills of woodworkers, potters, weavers, blacksmiths and craftsmen were key to these communities. These professions and domestic crafts such as butter and cheese making, beer brewing, pig salting and many more were practiced from the home or in workspaces adjacent. Welsh cottage crafts which required no additional workspace or specialist tools were practiced in the home in spare time and included knitting, blanket, mat and stocking making.

A range of workplace dwellings are examined, with focus on those with their foundations in the cottage type. A lack of literature which combines working aspects and life in dwellings is observed from the literature review. Frances Holliss argues that this is a result of a method of

¹⁰ Frances Holliss, 'Beyond live/work', *Planning in London*, 67 (2008), 22-24
<<http://www.planninginlondon.com/assets/PIL67%20UPLOADS/Holliss%20final%20pages%20pil67.pdf>>
[accessed 28 July 2010] (p.22).

¹¹ Frances Holliss, 'From Longhouse to Live/Work Unit: Parallel Histories and Absent Narratives' in *Built from Below: British Architecture and the Vernacular*, ed. By Peter Guillery (Oxon: Routledge, 2011), pp.189-207 (p.191).

categorising buildings by historians according to principal type, disregarding their dual use.¹² A broader investigation of field work is therefore required to examine dwellings and crafts separately with the objective to bring the information together in an attempt to understand how working and living co-existed in dwellings and together within the wider community.

The study uncovers variations in types of workplace dwellings. However it is acknowledged that in contemporary architecture 'a lack of understanding of these distinctions has led to problems in the development of 'live/work' schemes in the UK where local planning authorities thought they had given permission for 'work dominated' workhomes, but 'home dominated' were built.'¹³

Examples of traditional workplace dwellings are discussed in terms of the relationship between work and living. They have been put into the three principle categories, including dwelling dominates, dwelling and workplace with equal dominance and workplace dominates. These classifications are taken from those identified by Frances Holliss in the article *Beyond live/work*. They are useful because they help distinguish the primary function affecting live work in terms of building form, which affects a number of other issues including human factors and functional use. The author has interpreted the terms spatially through concept diagrams to illustrate the separation and combination of living and working in the case study examples. A number of building studies have been explored within the three types, where forms vary within the categories to cross examine the typology in more detail. The case study precedents are chosen because of a lack of alternative published examples where dwelling and associated workplace are documented. They also provide a range of examples situated across Wales in their various forms.

¹² Ibid., p.190.

¹³ Frances Holliss, *A Brief History of the Workhome* <<http://www.theworkhome.com/history-workhome/>> [accessed 15 March 2011]

The case study examples are categorised into three types as follows:

(Note: In the concept diagrams no shading represents living, hatched represents a combination of living and working in the same space and shading represents working)

1. Dwelling dominates



- Llainfadyn Cottage built in Rhostryfan, Gwynedd in north west Wales in 1762 housed quarry workers but has since been re-erected at St Fagans National History Museum.
- Llawr y glyn Smithy originally located down the road from the blacksmith's house in Llawr y glyn, Powys, was built in the 18th century. It was also dismantled and re-erected at St Fagans National History Museum.

2. Dwelling and workplace with equal dominance



- The tailor's workshop and house in Wern-gerhynt in the parish of Llanbryn-mair, Powys.
- Nant-gwyn Smith Shop and adjoining house, situated along the road from St. Harmons to Llanidoes near Pant y dwr.
- Olwen House situated in Blaenplwyf, Cardiganshire before it was demolished. It was a roadside cottage of crogloft type with a cobbler's workshop built to one side of the central entrance at a later date.

3. Workplace dominates



- Weavers' houses with open workshop floors on the top floor, such as 1 - 4 Union Street, Penygloddfa, Newtown.

5.2.2 Characteristics and principles

Characteristics and principles extracted from the case studies are described in terms of issues relating to the physical environment, construction, form, human factors and function of the workplace dwellings. Many associated themes are discussed within these principal themes and overlap in some cases. Principles and characteristics of workplace dwellings are presented in the categories below:

Physical Environment: Climate, Siting, orientation

The traditions of location and siting of workplace dwellings depended greatly on the types of work carried out and the dominance of work over dwelling in households. In some cases work dictated location and siting of workplace dwellings and in other instances where work was less dominant it did not affect where they were located.

In examples where dwelling is the dominant function, the workplace was either situated nearby the house in a building specifically constructed for its purpose or as a secondary dimension within the dwelling. An example where workplace and dwelling are completely separated, but conveniently located nearby one another is in a house of a blacksmith in the small village of Llawr-y-glyn. The house once stood close to the smithy's workshop, which was situated on the main road in the heart of the village to serve the local community and to receive passing trade. It can be observed from the plan of the workshop that primary openings were positioned on south-east and south-west elevations to maximise light conditions to work in. Smaller openings to the north provided additional light and ventilation to the space.



Fig. 5.1 Llawr-y-glyn Smithy and house down the street

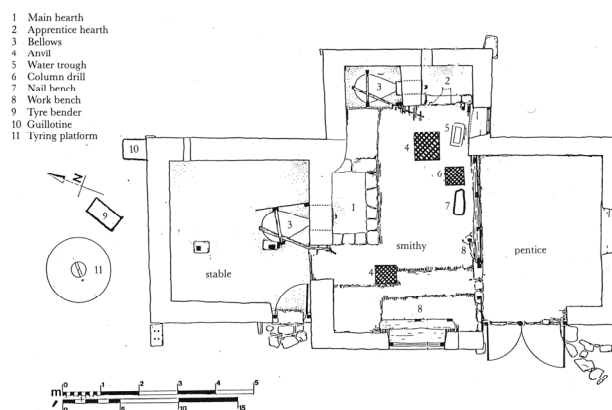


Fig. 5.2 Plan of Llawr-y-glyn Smithy

Where a separate workshop was not available in the case of the majority of cottages across Wales, subsidiary work related tasks were carried out in the main living space of the house. Most people living in cottages were either crofters dependant on a few acres of land for their

living, labourers or craftsmen, who furthered their income by working on local farms.¹⁴ Even if cottagers were not craftsmen by trade, they were versatile in the tasks that they could perform. The occupiers of cottages 'made do' with the space they had to perform their daily errands and crafts and cottages were not specifically located for the work carried out in them. However, the work performed was dictated by the resources available in the area.

There is little distinction of where work was carried out in dwellings from the living space. Spaces within houses were utilised according to activity, time of day or night, and season. The kitchen and living space was the heart of the cottage and where most tasks were pursued. Cottages where crafts were realised in the main living space are virtually indistinguishable from those where they were not. Most forms of making did not require work to be separated from domestic life in the home. At Llainfadyn cottage, located nearby the place of work of a quarry worker, subsidiary crafts were carried out in the one room dwelling. A settle by the fire, positioned by the largest window opening was where works would have been produced in the best lit conditions.

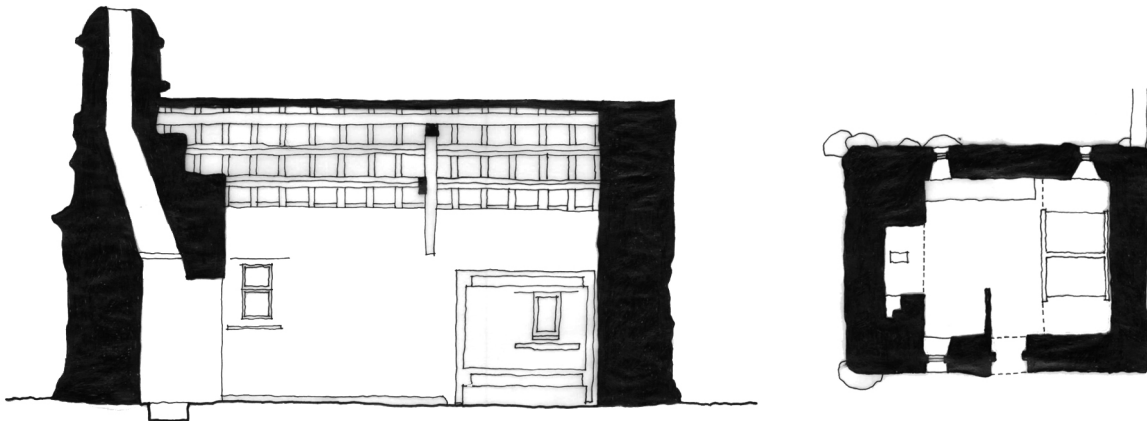


Fig. 5.3 Section of Llainfadyn cottage where many work related tasks and daily errands happened in one room; Fig. 5.4 Plan of Llainfadyn cottage

Where machinery or tools for making were more specialised and the scale of activities increased, extensions and modifications to existing houses were made. In these cases the two functions are disconnected, but have equal status to the street, sometimes with an internal opening. An example of this can be seen in the addition of outbuildings which would have housed looms adjoining two weavers' cottages of a tailor in Wern-gerhynt, now in ruins.

Weaving was an important craft at different times and in various parts of Wales, in particularly in North Powys and neighbouring areas of Clwyd and Gwynedd. It was initially employed in cottages before the craft developed in scale into an industrial process. In cottages and farmhouses yarn was spun and cloth woven to produce rugs, blankets, flannel and tweeds for the household. The method of woollen cloth making was mainly carried out by hand in the homes of small-holders and farm workers. Some farmers who were weaving masters kept

¹⁴ Martin Davies, *Save the Last of the Magic: Traditional Qualities of the West Wales Cottage* (Cardigan: Martin Davies, 1991), p.5.

looms in an outhouse or lean-to shed, *tŷ gwŷdd* (loom house) and hired farm labourers to work the looms when they were not working on the fields and when farm work slowed down in winter.¹⁵ The woven cloth was cleaned to eliminate oils and dirt and compacted at a local fulling mill or *pandy*.

Most country weaver's houses are difficult to identify, other than they often have a large window in one room of the house, but there is mostly no evidence of a spinner or loom-weaver working there. Larger windows in each house at Wern-gerhynt reveal spinning and weaving also happened within the dwellings.

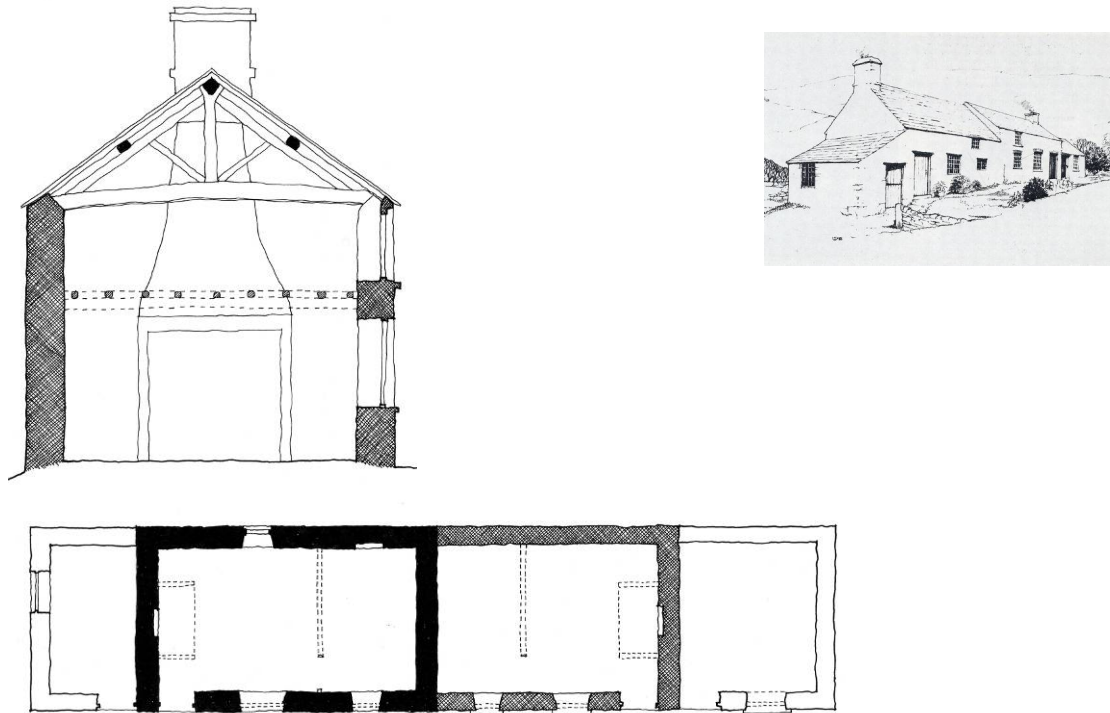


Fig. 5.5 Section of Tailors' houses in Wern-gerhynt; Fig. 5.6 Impression of Tailors' houses and workshops in Wern-gerhynt by Simon Unwin; Fig. 5.7 Plan of the houses - the first was built (dark shading), followed by the second (hatching) and later the outbuildings to house looms were constructed (no shading)

Another example of a smithy as a workplace dwelling is at Nant-gwyn near Pant y dwr. In this case the smith shop adjoins the house and has a separate entrance as opposed to Llawr-y-glyn smithy which is isolated from the house. The workshop built at a later date, however is similarly situated along a major route, from St. Harmon to Llanidoes to gain trade from passers by.



Fig. 5.8 Nant-gwyn Smith shop with house adjoining along a busy traders route

¹⁵ J. Geraint Jenkins, *The Flannel Makers: A Brief History of the Welsh Woollen Industry* (Llandysul: Gomer Press, 1985)

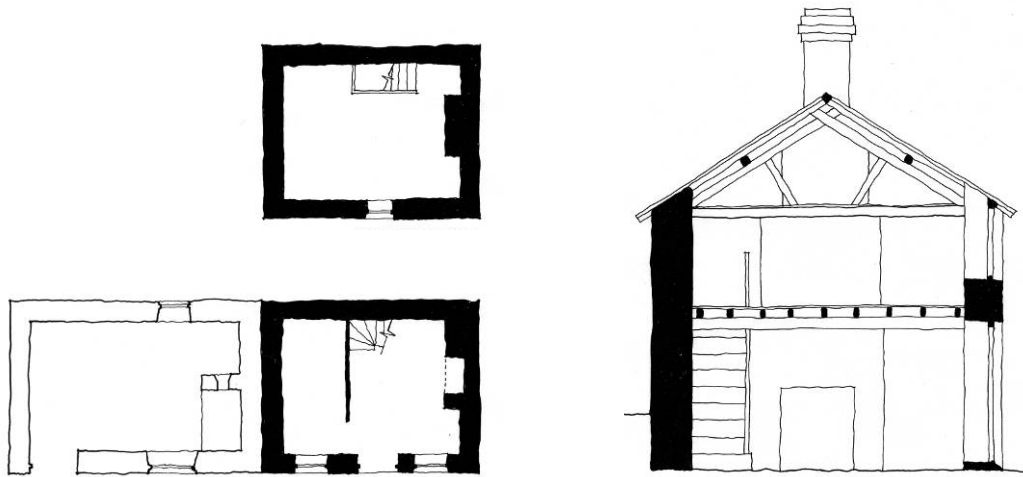


Fig. 5.9 Plans of Nant-gwyn Smith shop and adjoining house, the blacksmith's workshop was erected after the house was built; Fig.5.10 Section through house

A further example similar to Nant-gwyn Smith shop is a small cobbler's shop, adjoining Olwen House in Pont-lanio built sometime after the clay cottage was first constructed. The later cobbler's shop likewise only has external access from the house and was built out of masonry onto the main street at the heart of the village.

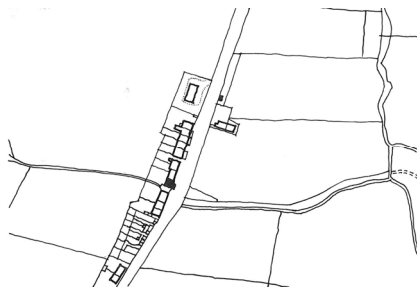


Fig. 5.11 Nant gwyn Smith shop in Pont-lanio situated along the main street

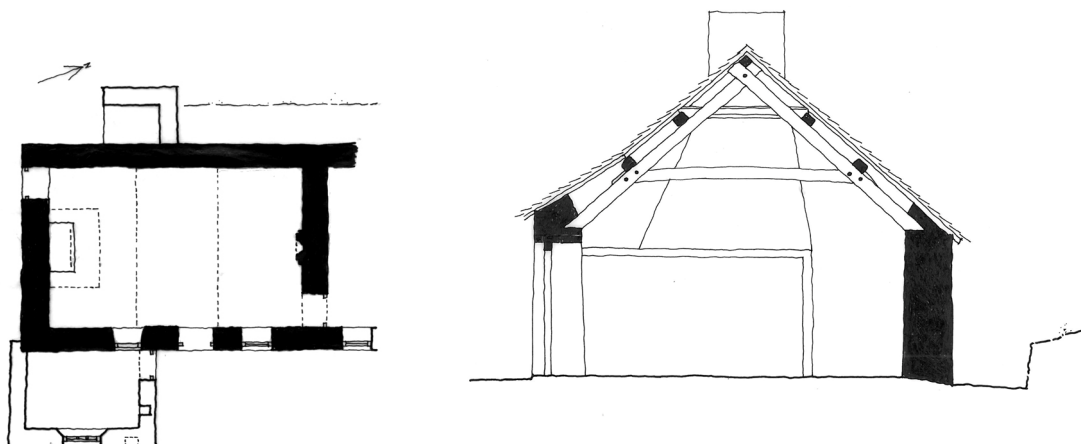


Fig. 5.12 Plan showing the cobbler's workshop was added to the front of Olwen House off the roadside; Fig. 5.13 Section showing it is a croft type cottage

Weavers' shops designed specifically as a workplace for industrialised machinery and living accommodation for workers, housed families on lower floors and contained a communal workplace on the upper floor. Whereas 'traditionally the craftsman's workshop was part of, or next to, his house; the Factory Room adapted this tradition to the needs of the weaving industry, by bringing together under one roof the craftsmen who worked for one master.'¹⁶ Here the workplace dominated the building and the requirements of the workplace dictated the form. Weavers' factories in towns are recognisable by their rows of wide windows on the top floors. These later cottage industry workplace dwellings often had a scullery and kitchen on the ground floor with two bedrooms above and an unobstructed floor space on the upper floor with a well lit strip of windows, as good daylighting was required. Windows were the full length of walls as structurally possible and the frames were made of iron from local forges and later foundries. Ventillation needed to be regulated as a smoke and dust free atmosphere was required. Workspace required an unobstructed area without walls and piers to fit large machinery in, which was the reason for it being accomodated in the attic space. Many examples of weavers' shops are found in the textile working towns of mid-Wales. An example is 1-4 Union street, Newtown where one up, one down houses accommodate shared workspace on the floor above. The chimney and stair are positioned to the two back corners to be less obstructive of the large open space in the roof.



Fig. 5.14 Old photograph of 1-4 Union street, Newtown

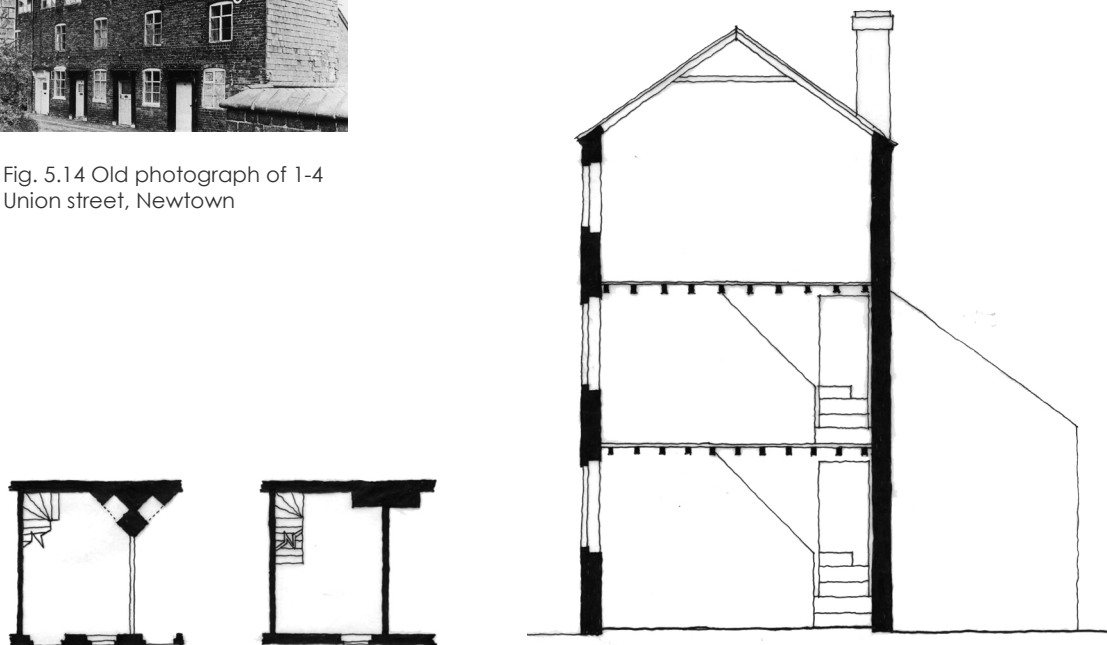


Fig. 5.15 Plans of ground and middle floors; Fig. 5.16 Section of the three storey weavers' houses in Newtown with living accommodation on the lower floors and open workshops on the top floor

¹⁶ Jeremy Lowe, *Welsh Industrial Workers Housing 1775-1875* (Cardiff: National Museum Wales, 1994), p.13.

Construction

Rural communities were mostly self-sufficient and relied on their locality and neighbourhood to produce the basic necessities. It was 'more than a social entity; it was an economic entity as well, for most of the countryman's needs could be met by members of the local community itself.'¹⁷ The resources available to a region influenced the work carried out by the cottagers and the way the dwellings were built, which housed various work related tasks. Products made by craftsmen were specific to the locality and therefore suited local conditions of the place.

Eurwyn William explains that the cottagers could 'turn their hand to anything... forced to make use of every available resource: briars stripped of their thorns served to make baskets, while supple eel-skin tied together the two parts of the wooden flail used for threshing.'¹⁸ The construction of dwellings was just as resourceful as the work which was carried out in them, built by the inhabitants and local people. The construction was simple and often crudely built as the resources available were primitive and materials were not worked by specialised craftsmen. However the construction and furnishing of dwellings 'involved numerous craft skills, often using materials which were truly vernacular and found close to hand.'¹⁹ The cottages reflect the vernacular of a region – clay, stone and timber depending on the prevailing resources of a place. Llainfadyn cottage originally built in Gwynedd is constructed of large mountain boulders and heavy oak trusses, supporting a roof of locally quarried slates, whereas Olwen House in Cardiganshire was constructed of clay, typical of west Wales.

Cottages often originated as a temporary dwelling and underwent several phases to reach a more permanent state. Initially large numbers began as Ty Unnos (house in one night) in the form of a clod (turf) hut.²⁰ These were replaced by rubble walls and later permanent buildings of stone, timber or clay specific to the locality.

Obtainable materials were employed efficiently. Timbers were jointed in the method of scarfed crucks where quality timber was unavailable and brambles and other natural materials were woven to form wickerwork partitions. Roofs were originally thatched of straw or rushes.²¹ The skills and crafts carried out within the cottages were utilised in the building fabric and construction. It has been suggested that the 'Welsh cottage built cooperatively and from sustainable materials may have lessons for future society in Wales,'²² and this research explores this.

¹⁷ J. Geraint Jenkins, *Welsh Crafts and Craftsmen* (Llandysul: Gomer Press, 1975), p.5.

¹⁸ Eurwyn William, *Home-made Homes: Dwellings of the rural poor in Wales* (Cardiff: National Museum of Wales, 1988), p.9.

¹⁹ Richard Suggett and Greg Stevenson, *Introducing Houses of the Welsh Countryside* (Talybont: Y Lolfa, 2010), p.171.

²⁰ *Ibid.*, p.168.

²¹ *Ibid.*, p.173.

²² *Ibid.*, p.176.

Form

Dwelling form was determined by the resources and skills available. Cottages were minimal in size due to constructional capabilities of resources available, particularly span of materials and practicalities of requiring a sufficient place to live and keep warm, often only by a single fire. Houses were therefore adequate to accommodate the family, and to carry out errands and pastimes. Window openings were small due to practical restraints, limited by size of materials and the necessity to allow enough light into the dwellings to perform the cottager's daily tasks without the loss of too much heat. A window was often positioned by the fire to let light in, where the majority of crafts were executed. Dwellings were therefore humble and human in scale due to limitations in terms of resources, buildability and comfort.

Space was exploited within dwellings, used efficiently and adapted to occupants changing needs. Open plan living allowed for flexibility and a larger usable space. The small area of space above the box beds furthest away from the cooking hearth in the one roomed cottage at Llainfadyn was made into a loft and used for sleeping. Simon Unwin explains that these cottages

display skill and subtlety in the way elements are composed to organise space into places. The skill may have derived from working directly with materials and allowing spaces to evolve over time in response to use, rather than by designing through the abstraction of architectural drawing and with the expectation that a building should be perfectly organised when first completed. Such skill and evolutionary amendment through time produces a directness and immediacy of relationship between places made and the life they accommodate.²³

This consideration and modification of place over time has resulted in an economical way of using space and living within a minimal amount of space.

Elements of these compact dwellings often provide more than one function and 'the space inside the house is disposed into places in economical and intriguing ways. Rather than using walls to compartmentalise it into rooms in what has become the orthodox way of organising houses, places within the house are defined by the furniture and by simple elements.'²⁴ The draught screen at Llainfadyn by the door, not only inhibits draughts, but creates a more defined entranceway and also a warm place to sit by the fire. Unwin describes that, 'the architecture frames daily life and its more mundane rituals'.²⁵ The form and internal nature of workplace dwellings reveal both the working and living aspects of life in the architecture.

The workshop element of buildings with equal dominance of work and living were commonly a later addition to the primary dwelling form. The form of workshops was determined by space requirements of the work to be carried out in them and essential machinery needed to be accommodated alongside the existing dwelling which was often unaltered. Weavers' shops however were designed and built specifically for the work and living arrangements required,

²³ Simon Unwin, *Analysing Architecture* (London: Routledge, 1997), p.233.

²⁴ *Ibid.*, p.234.

²⁵ *Ibid.*, p.234.

but the form was specifically determined by the work function as seen in the examples at Newtown.

Human factors

People who lived in rural cottages and farmhouses relied heavily on their surrounding community to live. Martin Davies explains the importance of the community life for cottagers and the dependence they shared with one another.

The principle of mutual help, or *cymortha* meant that collectively, cottage communities were practically self sufficient. Implements and later, machinery were shared; likewise labour and sometimes food: pig-killing, for example, was staggered so that the choice pieces not to be salted were taken round the neighbours. They would each in turn reciprocate when they killed their pig. More than this, however, people's lives were shared, both the joys and the tragedies.²⁶

Neighbourhoods formed a diversity of specialist trades, with greater production of certain goods in some areas. The work of the blacksmith was crucial to the people and workers of all communities. The smith's workshop was the place where horses were shod and treated for their illnesses. Vehicles were repaired, farm machinery, tools, household fittings and utensils were made and repaired, and boots and shoes could be iron-tipped. Workshops were often a busy social centre and particularly blacksmiths' shops where people would gather during their leisure times. It was always open as blacksmiths worked long hours and it was warm and dry throughout the year. In areas where the Welsh Nonconformist religion was practised, workshops were used as a place to congregate as going to local pubs was prohibited.²⁷ This was the case at Llawr-y-glyn smithy.

Textile workers were as critical as blacksmiths and carpenters in rural communities. Every parish had spinners, weavers, dyers and fullers. It is seen that the people living in cottages were 'no longer something on the margins of rural society' but they were part of a 'peopled landscape where important things happened.'²⁸

Items made in cottages and by craftsmen were sold at town fairs and markets, or often directly to travellers on the roadside.

'Small centres for trade and marketing developed as small towns or villages (e.g. Bala, Tregaron, Machynlleth, Llandeilo). These and their like became the focal points of local communities... Until the coming of the motor-car and recent transport development many of these small communities were considerably isolated and were the homes of close-knit communities, essentially self-supporting, literate, and culturally active.'²⁹

Despite the communal nature of cottage life, people still desired a degree of privacy as illustrated in the later partitioning of spaces within cottages to create separate rooms and

²⁶ Martin Davies, *Save the Last of the Magic: Traditional Qualities of the West Wales Cottage* (Cardigan: Martin Davies, 1991), p.5.

²⁷ John Williams-Davies, *The Craft of the Blacksmith: Llawr-y-glyn Smithy* (Cardiff: University of Wales Press, 1991), p.19.

²⁸ Colin Ward, *Cotters and Squatters: Housing's Hidden History* (Nottingham: Five Leaves, 2002), p.107.

²⁹ Iorwerth Peate, *Tradition and Folk Life: A Welsh View* (London: Faber and Faber, 1972), P.72.

places. The living accommodation and workplace of weavers' shops had to be considered in terms of public and private divisions as workplaces were shared on the top floors. Access for goods and workers needed to be separate from the living accommodation to provide privacy for the people at home. In some trades a hoist and 'taking inhole' for raw materials was needed and a separate access for workers, as the workplace might be let out separately from the house and non-resident labour employed. Often the factory owner would also own a Tommy or truck shop at the end of the row.

There is little evidence to explain how the two conflicting uses of weaver's shops functioned together, in terms of cleanliness, noise levels and separation of public and private space. Even though vernacular buildings are often thought of in their social environments, it is often still difficult to establish how they routinely functioned.³⁰

Function

Dwellers in rural areas were flexible and worked in a number of skills depending on the season and state of the trade, such as in a combination of textile manufacture and agriculture. Similarly they were resourceful and flexible in the way in which they lived and extended their property when they could do so. Initially as early cottage industry developed there was little change to dwelling form, but as machinery was introduced, became more specialised and the scale of activities increased, modifications to existing houses or extensions were made. At the early stages, alterations to living areas were made and/or separate workshops were built alongside existing dwellings, to make room for simple machinery.

The simplest cottages were one roomed and the whole family lived and slept together. Furniture was used as partitions to divide the space. The living and sleeping ends were often separated by a dresser or linen press. From this the two roomed partitioned cottage evolved. The kitchen and living space with the hearth was positioned to one end and the parlour to the other. The cottages were still often overcrowded and some were full of box beds. It is thought these may have 'supported the first crude lofts'³¹ as at Llainfadyn, which were accessed by a ladder or the back of a chair. The *crogloff* developed from this as a properly constructed floor and partition above the parlour, leaving the space above the kitchen and living area open to the roof.

The cottage typology developed further, in some cases by raising the eaves height to allow greater space in the roof and a complete first floor to be built. A window would often be inserted in the gable end to bring light in. A lean-to was commonly built on cottages and smaller cottages were extended at the sides into a parlour or bedroom and additional

³⁰ Frances Holliss, 'From Longhouse to Live/Work Unit: Parallel Histories and Absent Narratives' in *Built from Below: British Architecture and the Vernacular*, ed. By Peter Guillery (Oxon: Routledge, 2011), pp.189-207 (p.201).

³¹ Martin Davies, *Save the Last of the Magic: Traditional Qualities of the West Wales Cottage* (Cardigan: Martin Davies, 1991), p.5.

outbuildings. However, 'the development of the cottage should not be taken as a tidy progression... Cottages have frozen at all these different stages of evolution'³² to suit the function and requirements of its occupants at various stages.

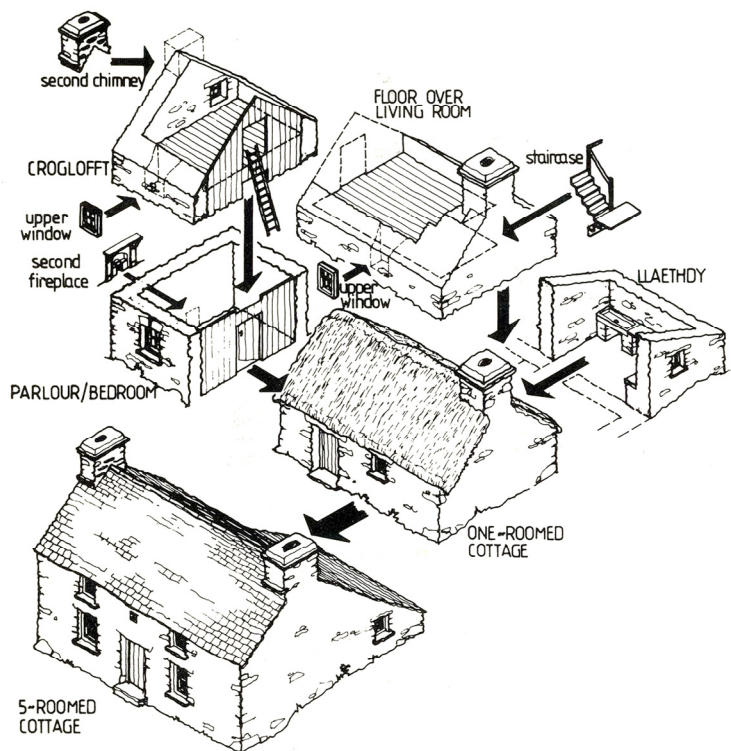


Fig. 5.17 Stages of development of a typical West Wales cottage, from one room to five

Gradually completely new constructions were being built to cater for minor industries. The weaving shops in Newtown, Powys, characteristically were three or four storey brick terraces with the cottage dwelling below and weaving shops that accommodated handlooms on the upper floors. Smaller windows on lower floors suggest living accommodation and wide windows on the upper floors indicate the positions of the looms. Distinct and varying scales of windows reveal the dual-use of buildings. They were often back to back, with the factory entered by an external staircase to the back of the terrace. Narrow passage ways through the ground floor of each block gave access from the street to the back row. They were based on designs from earlier workplace dwellings in the English Midlands.³³ The large areas of glass may have led to problems with overheating and glare on sunny days and heat loss in the winter and the handloom weaving process was noisy and very dirty.

These later workplace dwellings were much less flexible than the individual cottage, but were designed specifically for the functions they were housing. There was much less opportunity for the occupants to expand or modify their dwellings and the workplace dominated the form.

³² *Ibid.*, p.10.

³³ Cadw, *Industrial Workers' Housing in Wales: Care and Conservation* (Cardiff: Cadw, 2005) http://cadw.wales.gov.uk/docs/cadw/publications/Industrial_Housing_EN_CY.pdf [accessed 8 June 2010]

5.2.3 Summary

The diverse range of associations between work and living are illustrated in the case study examples categorised into three principle groups depending of the dominating feature of the workplace dwellings. The predominance of a function, whether living or working or equal, influences the physical form and relationship of spaces. Certain crafts necessitated specific siting requirements and it was important to be positioned near trade. Other cottage crafts were less reliant on siting and humble tasks could be fulfilled with no alteration to the dwelling. The research demonstrates how in some situations workplace dwellings need to be specifically organised due to complexities brought about by locating certain types of work besides living. Whereas in other cases this is less of an issue and the relationship between work and living or public and private is less critical.

The research illustrates how craftsmen and cottagers were versatile and resourceful in the work they performed and similarly the way in which they built their dwellings. They obtained materials locally and utilised whatever resources they could find. Limited craft skills and resources were applied to the construction of dwellings, which determined the form. The cottagers however relied on the local community and together a locality was self sufficient.

Buildings were compact and minimal and the people were innovative in the way in which they used space and allowed for a degree of flexibility. Open plan living enabled space to be used freely with furniture used to divide space and define places. Adaptability and modification of dwellings meant an efficient way of living was developed to suit the lifestyle of the household over time. Form was extended in various ways as requirements and opportunities changed. Rooms for specific functions emerged as more space was made available in dwellings and people aspired to create more private places. The introduction of central heating systems also allowed dwellings to be separated into individual spaces. However, where minimal and compact living is necessary, the open plan arrangement and multiple uses of spaces demonstrated in cottages, provides a more appropriate solution to maximize space available.

In addition to the application of the typology itself being relevant to re-appropriate for design today, the study emphasises a number of key principles involving the sustainable nature and resourceful way in which the people built their workplace dwellings, through an economy of means. In the live work type, the importance of functions of working and living led to more research being undertaken on the functional use of buildings and inhabitation of space. In the pilot study there was much less emphasis on how space could be used, which if acknowledged and implemented in greater detail could have benefited the design outcomes.

5.2.4 Case studies - Contemporary live work

Despite the reintroduction of live work developments in various parts of the world, including London in the UK, this has not been the case in Wales. There is difficulty in finding any published examples of contemporary buildings that combine both living and working within the same building in Wales, even though the typology presently exists in diverse forms throughout the country. Contemporary building studies located in the UK are selected from a limited number of examples found in published literature, which are explicitly referred to as live work. It must be recognised that the case studies chosen are not referred to as having a connection with tradition in publications or by the architects. No built examples of live work were identified as being drawn from tradition, so the case studies are chosen where the type relates to tradition, rather than formed from principles of tradition. Three case study examples located in the UK are chosen and examined to correspond with the traditional case studies investigated, in terms of the identification of dwelling dominates, equal dominance, and work dominates. The contemporary building studies and the relationship between work and living are compared against the examples of tradition in the diagram below. No shading represents living, hatched is shared work/living and black shading indicates place of work.

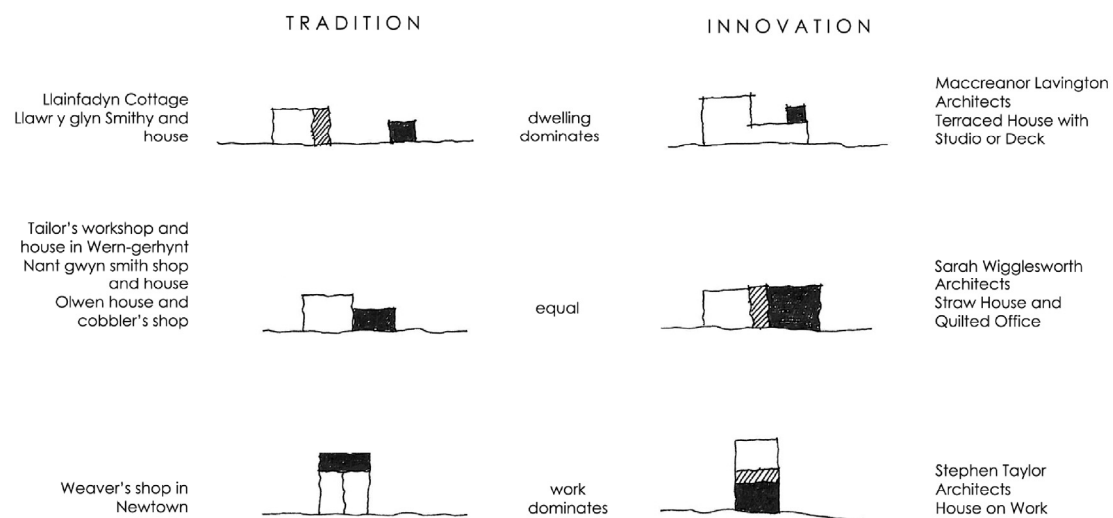


Fig. 5.18 Comparison between traditional and contemporary examples of live work in terms of live or work dominates

A row of terraced houses with a studio or deck by Maccreeanor Lavington Architects in Cambridge is selected as an example where workplace is separated from dwelling, and dwelling clearly dominates form. The layout can be likened to the typology of house with home office positioned at the end of the garden. However the design allows internal access to the studio from the house, so maintains a much stronger relation to the dwelling, despite appearing disconnected. This exemplar housing scheme is analysed as it provides a solution suitable for application in urban areas, in terms of form and density. The sizes of units however

are very substantial and far from minimal in scale compared to traditional examples. Sarah Wigglesworth Architects' straw house and quilted office in London provides an example where dominance of home and workplace are equal. It is chosen because it demonstrates how space can be shared and occupied for two very different purposes and uses. It also displays how route, form, materials and specific details can be used to help define functions and distinguish public and private places. The design however does not share principles of economy of means with the traditional cottage type. Stephen Taylor Architects' House on Work in London, where workplace dominates the brief is selected as it offers an example where the design is economical of space and simple in form and arrangement. It demonstrates an approach of open plan living and very flexible non specific space.

5.2.5 Terraced House with Studio - Maccreanor Lavington Architects

This is an example of where dwelling dominates form. It exhibits how small workplaces can be incorporated successfully into a housing scheme of density and be functional and flexible to varied and changing needs. Two house types with studio or deck form a terrace of 18 houses to create one side of Aberdeen Avenue, part of the Accordia development in Cambridge. The four storey houses draw on the traditional English terraced house with a pedestrian pathway to the front and access to garages and studio spaces via a mews at the rear of the properties.³⁴ To the back of the dwellings there are either planted terraces on the first floor or alternatively a small workspace. The layout aims to provide flexibility and adaptability and to be able to adjust to the requirements of modern family life in an urban context.

5.2.6 Analysis and identification of principles

Siting

The houses are part of the Accordia development in a neglected area of Cambridge on the outskirts of the city centre. Accordia was part of a national plan to increase the density of existing urban areas. The project aimed to create a type of city dwelling with the comforts and advantages of suburban housing. The terraces are positioned on an east-west axis, with rear sun decks located to receive evening sun to the backs of the properties.

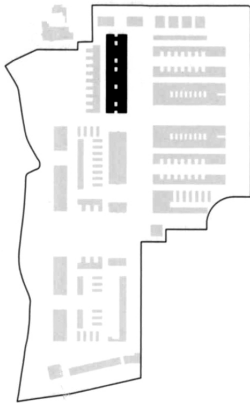


Fig. 5.19 Terrace of workplace dwellings within the Accordia scheme in Cambridge

Form and Arrangement

The houses are entered at the fronts off a communal path and through a small front garden and veranda. The mews to the back of the properties provide a quieter, more private entrance and a place to park the car. At the rear of the terrace there is a detached and independent entrance to the studios away from the main house. The workspace is the full width of the garage below and opens onto the first floor terrace. It is connected internally to

³⁴ Mike Keys and Stephanie Laslett, *Dwelling: Accordia* (London: Black Dog, 2009), p.54.

the house from the ground floor by a staircase within the dwelling. The studio space could alternatively be used as a playroom, home office or as a guest bedroom. The houses without studio spaces have a timber deck with overhanging planting in its place and have external steps connecting to the garage and mews below. Rather than having an external courtyard, this house type has a double height space that connects the kitchen and dining room with the living area above. The combination of the studio and deck dwelling types, break up the uniform rhythm of the street and makes the studios appear as defined buildings in the row. It was anticipated that the addition of a studio space could assist in accommodating changing needs of families and a create variety of spaces that could be easily adapted to different uses.



Fig. 5.20 Plans of terrace with studio (above) and deck (below)

The dwellings are 240m² excluding garage and the plot is only 5.2m wide with the staircase central to the plot. 'The houses fill the plots and external space is distributed throughout the height of the building. The kitchen and dining room open onto the courtyard and veranda and the principle first floor living space and studio relate to the terrace or deck. The master bedroom and its bathroom have their own private 'sky patio' with a view into the tree canopies.'³⁵ 'The design of the dwellings emphasizes the direct relationship between the rooms and a series of exterior spaces laid out over the entire building, which makes up for the lack of private space in the plot demanded by compaction.'³⁶



Fig. 5.21 View from studio (playroom) through courtyard to main house; Fig. 5.22 Deck and studio spaces

Materials and construction

The terraced houses with studio or desk use brickwork which closely matches the local Cambridge Gault clay bricks, traditional in the locality. These are used throughout the Accordia scheme. Natural and pre-patinated copper sheets are used for the bay windows, roofs and rainwater goods. Internally the finishes are thoroughly designed with bespoke joinery and a well thought out integration of services and fittings.

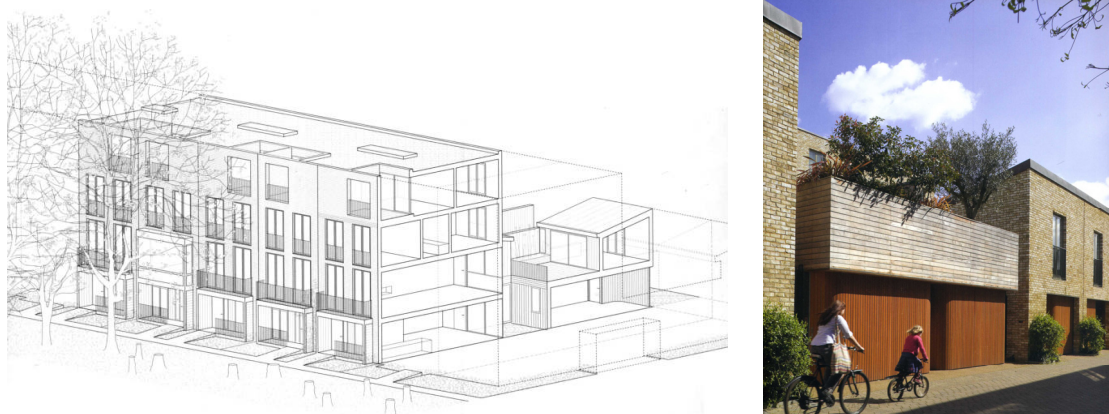


Fig. 5.23 Section through studio type; Fig. 5.24 View of mews with studios and deck to the rear

³⁵ Maccreanor Lavington Architects, *Accordia, Cambridge, England* <http://www.maccreanorlavington.com/website/en/project_907.html> [accessed 6 February 2013]

³⁶ Luis Fernandez-Galiano, 'Accordia Terraced Housing, Cambridge' *AV Monografias*, 126 (2007), 50-55 (p.50).

Environmental Issues

A holistic approach to environmental issues was taken over the scheme from materials and methods of construction to water usage. The homes achieved an Ecohomes 'Very Good' rating, 30% better in building energy performance than the requirements for Building Regulations 2002. This was due to a well detailed envelope with large amounts of insulation and a good standard of airtightness.³⁷ Renewable technology such as solar thermal collectors was then able to enhance an already efficient environmental strategy.

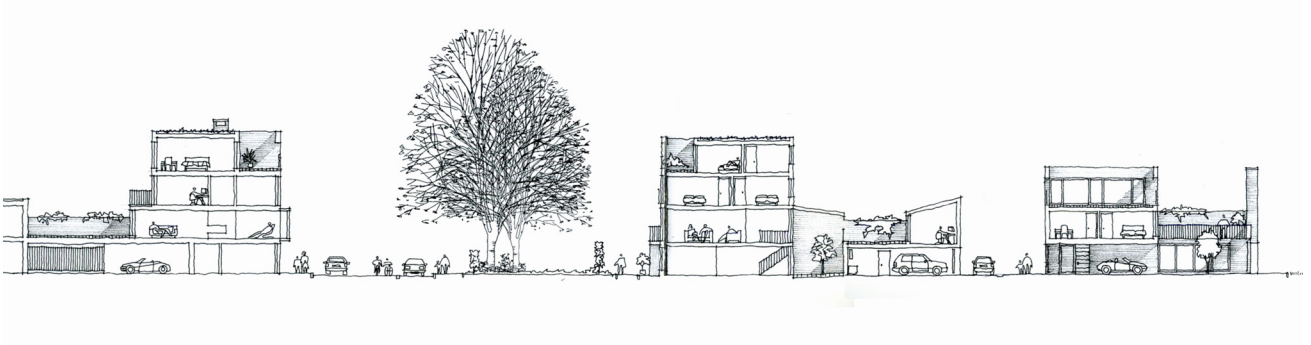


Fig. 5.25 Section through scheme showing various levels of shared and private space

³⁷ Mike Keys and Stephanie Laslett, *Dwelling: Accordia* (London: Black Dog, 2009), p.39.

5.2.7 The Straw House and Quilted Office - Sarah Wigglesworth Architects

The Straw House designed by Sarah Wigglesworth Architects at 9-10 Stock Orchard Street, Islington, London has a large studio office situated next to the house. It is referred to as a 'house with associated office'³⁸ by Frances Holliss. Sarah Wigglesworth lives at no. 9 and her office occupies no.10. It is an example where dominance of living and working are equal. It is identified as a case study example as it shows how diverse functions can occur alongside one another and a shared space can be utilised to allow different occupations to operate in the same space at different times. It also highlights how functions and use can be distinguished through materials, form and arrangement, to help identify work from living and public from private. The project is a sustainable living solution and a response to an increasing trend of people requiring a combined house and office. It addresses the conflicting issues of a public workplace and a private dwelling, but is a unique solution that principles could be taken from. The building also is far from minimal in size, with the floor area of the house being 240m², (similar to the Accordia scheme), big enough for twelve people to live in, according to the *London Housing Design Guide* and the office is 175m², twice the area required for Sarah Wigglesworth's architectural practice.³⁹

5.2.8 Analysis and identification of principles

Siting

The plot for the workplace dwelling was previously the site of heavy industry and is approximately 20m by 40m in length. The East Coast Railway line to King's Cross Station runs along the south-east edge of the site. The house and office are arranged in an inverted L-shape, with the office building parallel to the railway line. The house located to the north-east of the site creates a sunny south-west facing 'productive garden which addresses the work life balance by providing a calm place for occupants of both the house and office to take time out.'⁴⁰ Most of the building is raised off the ground on columns, with only a small area inhabited at ground floor level.

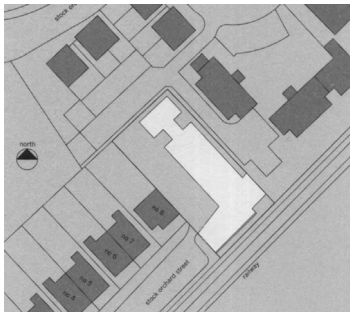


Fig. 5.26 Site access to the south west and railway running along the site to the north east

³⁸ Frances Holliss, 'House with associated office' in *Around & About: Stock Orchard Street*, ed. by Matthew Barac and Sarah Wigglesworth (Oxon: Routledge, 2011), p.84.

³⁹ *Ibid.*, p.94.

⁴⁰ Sarah Wigglesworth Architects, *Mixed Use: 9-10 Stock Orchard Street* <<http://www.swarch.co.uk/assets/Uploads/stock-orchard-street/swa-stock-orchard-street.pdf>> [accessed 29 January 2013]

Form and Arrangement

In terms of workplace and dwelling there is no predominant function, but one is very public and the other very private. The two functions from the street are not obvious to read but a shared gate off the main street has two doorbells giving dwelling and workplace the same significance. Inside the main gate the public and private aspects of the development have very different and separate entrances. The office is very visible once inside the site and the entrance is on axis. An approaching visitor is announced by the crunchy gravel path to the entrance.⁴¹ The pathway to the house in contrast is winding and the entrance hidden from view through the garden. 'It is a path taken only by those who know it is there.'⁴²

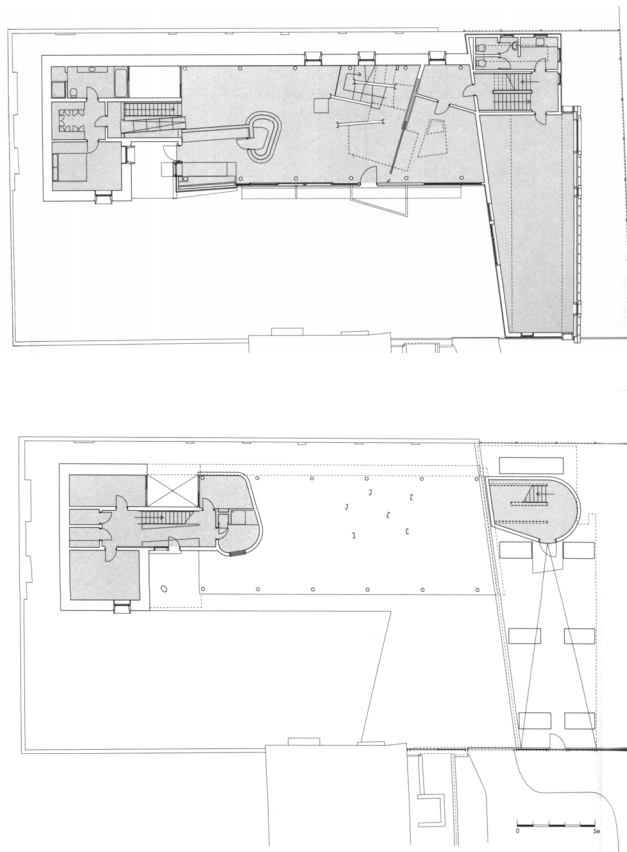


Fig. 5.27 Upper and ground floor plans

The office is an open plan rectangular box with an upper level that could be rented out in the future. A double height space at the heart of the scheme functions as a shared space, as a dining room for the home and a conference room for the office. 'It forms a pivot-point between home and office.'⁴³ The neutral space has a sliding wall, which is kept shut during the day and used as a meeting space and opened at night to be used as a dining room and then becomes part of the home. It also creates an internal connection between the home and the workplace. The main living space is mostly open plan and is flexible and can adapt to

⁴¹ Frances Holliss, 'House with associated office' in *Around & About: Stock Orchard Street*, ed. by Matthew Barac and Sarah Wigglesworth (Oxon: Routledge, 2011), p.87.

⁴² *Ibid.*, p.87.

⁴³ *Ibid.*, p.89.

the occupants living patterns. The bedrooms however are at the opposite end to the office and are more intimate, wrapped in the straw bales as insulation.



Fig. 5.28 Meeting room; Fig. 5.29 Dining room

At the top of the book tower is a place where Jeremy Till writes his books, when he is not working at his full time job in a dedicated office elsewhere. He also works from his bed, on the kitchen table and sofa in the living area of the building. Similarly Sarah Wigglesworth doesn't work from 9 until 5 in her office but sometimes works in their home on the sofa.

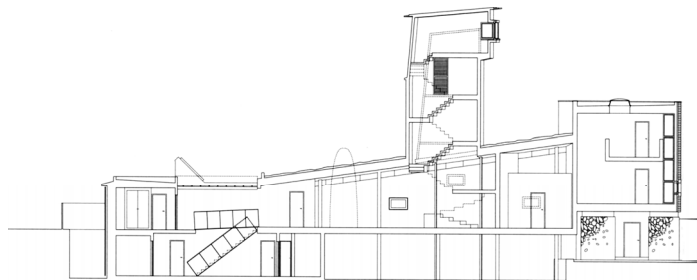


Fig. 5.30 Section through book tower

Materials and Construction

The two functions of the project can be identified in the material and construction aspects of the scheme. Although the home and office are contained in one building, the construction and materiality are articulated differently. The office is more formal and rationally ordered with a quilted façade to the street and rectangular openings. The dwelling has a mono-pitched roof and in contrast uses a number of materials and different elements which are randomly configured. 'The office is a hybrid construction combining lightweight walls lined in Gyproc plasterboard and heavy construction (floors and ceilings). The house, by contrast is entirely lightweight, reflecting the shorter and more flexible occupation patterns characteristic of that zone.'⁴⁴ The public workspace and private dwelling is physically divided by a 44mm sliding plywood wall which divides the meeting room from the living room.

⁴⁴ Trevor Butler, 'From innovation to commonplace' in *Around & About: Stock Orchard Street*, ed. by Matthew Barac and Sarah Wigglesworth (Oxon: Routledge, 2011), p.106.

Materials with a lesser impact on the environment have been chosen for the scheme, including the use of straw bales, recycled newspaper infill, recycled concrete in the gabion cages and cement bags used to reduce noise from the railway on the office elevation. The non standard materials chosen are thoroughly considered and are used in unusual but resourceful ways.

Environmental Issues

Passive energy principles are incorporated into the design; the north-east and north-west walls are encased in straw bales for insulation and glazing on the south façade provides warmth from the sun through solar gain. The south-east facing office is positioned to make use of thermal mass and solar gain as the part of the building which is occupied for most of the day. 'Compared to the living space, the office has significantly higher incumbent heat gain due to its orientation (south-west-north-east), density of occupation, equipment loads and lighting standards. The potential problem that the additional solar gain could have caused to the office was mitigated largely through smaller windows that face south-east on to the railway lines'⁴⁵, which are used to ventilate the office space. The south elevation has a light shelf to reflect light deep inside the building in winter and shade the façade from high level sun in summer. A five storey book tower with a reading room at the top is used to cool the house in summer through natural ventilation as cool air is drawn up the chimney from below. The roof of the house is a planted meadow of wild flowers and is irrigated with rainwater. Rainwater is harvested for the composting toilet, washing machine etc. There are solar thermal panels on the roof to preheat water.

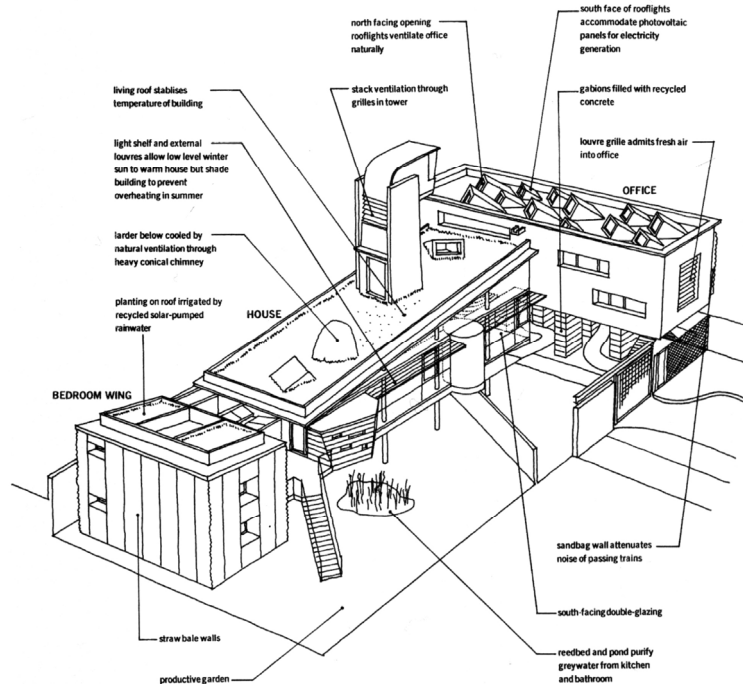


Fig. 5.31 Environmental strategy

⁴⁵ Ibid., p.108.

5.2.9 House on Work - Stephen Taylor Architects

The 390m² mixed use development, the House on Work on 153 Charlotte Road in London was completed in 2008 and includes an office and commercial space to be used as a gallery or showroom in the basement and on ground floor. A live/work studio unit is situated on the first floor and on the top two floors there is residential accommodation with a roof terrace. The site in 'Shoreditch has seen profound changes in the last decade since the influx of the creative trades seeking affordable live-work spaces.'⁴⁶ The scheme is an example where work dominates. It is significant to the study because it displays an example of economy through resourcefulness and flexibility of space and simplicity of form and layout.

5.2.10 Analysis and identification of principles

Siting

The 8m by 9m site was previously occupied by a two storey building, which escaped redevelopment in the nineteenth century. The neighbouring properties were redeveloped with larger scale warehouses and workshops that served the neighbourhoods burgeoning industrial economy and replaced the small one room deep eighteenth-century cottages. The surrounding street frontages are three to four storey industrial buildings of brick. The site being landlocked on three sides means the building relies on attaining light and air from only the front façade and roof.

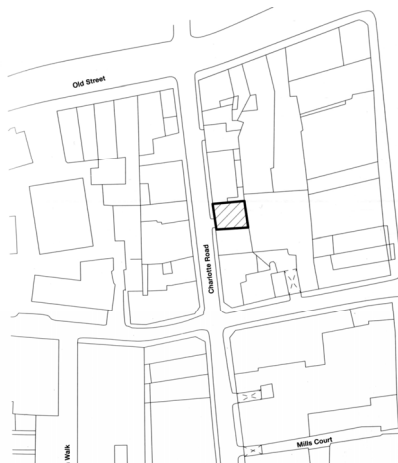


Fig. 5.32 Constrained site with access from only one side

⁴⁶ Irina Davidovici, 'Typology: Three house projects by Stephen Taylor Architects' *Architecture Today* 188 (2008) 34-40 (p.36).

Form and arrangement

The complex brief, with three different programmes fits densely into a single unit, ranging from very public to much more private places, stacked up in one volume. Davidovici writes that all the functions 'are accommodated in the unified volume of an ambiguously-fronted townhouse, recalling the capacity of Georgian architecture to adjust to changes in use and allow internal functional divisions that leave the outer physiognomy unperturbed.'⁴⁷ The tight plan, with numerous constraints has a range of degrees of openness, from the very private bedrooms to public showrooms and a roof deck open to views of the city. The functions are all concealed behind a straightforward street façade. The building could only be three storeys in height due to planning and rights of light constraints, but an additional floor was permitted if it was set back from the building line. This allowed for an external space on the roof at the front of the property and enabled light to enter into the building in varying ways.

The workplace functions in the basement and ground floors have been designed to be able to operate spatially and functionally together in the future, with the opportunity for stairs and openings to be easily created in the ground floor concrete slab. The first floor space is flexible with four large floor-to-ceiling windows across the single open space. The whole floor could be used as one large independent space that could function as a live work space. The second and third floor is the living accommodation with bedrooms on the second floor and a communal space with kitchen and living on the floor above. The ceiling height is higher in the living areas than in the bedrooms. 'Internally, the programmatic divisions are reflected in the vertical circulation: the timber staircase, wide and straight up to the first floor, becomes narrower and twists as it mounts towards the private quarters. From there, a widely spaced rigid mesh stair, painted white, leads to the roof terrace and doubles as a narrow skylight.'⁴⁸ A small inner courtyard on the second floor brings light and air into the chamber and the rear bedroom.

The openings in the brick façade show order and regularity, but there are slight variations in size and asymmetry. The openings get smaller the further up the building towards the top floor, where the elevation is set back from the street and the living quarters are much more private. In the narrow street, 'the header-and-stretcher depth of the reveals means that recessed windows are almost invisible until one gets close. Strong, rhythmic shadows give an archaic, private feel to the upper floors while the shop window and glass door, flush with the façade, directly interface with the public territory.'⁴⁹ The openings on the first floor are symmetrical and of equal height and spacing relating to the unified space behind. The two smaller rooms on the second floor are expressed externally as a divided space by the windows being subtly grouped in pairs where there is a room division revealing the function behind.

⁴⁷ Ibid., p.39.

⁴⁸ Ibid., p.39.

⁴⁹ Ibid., p.40.

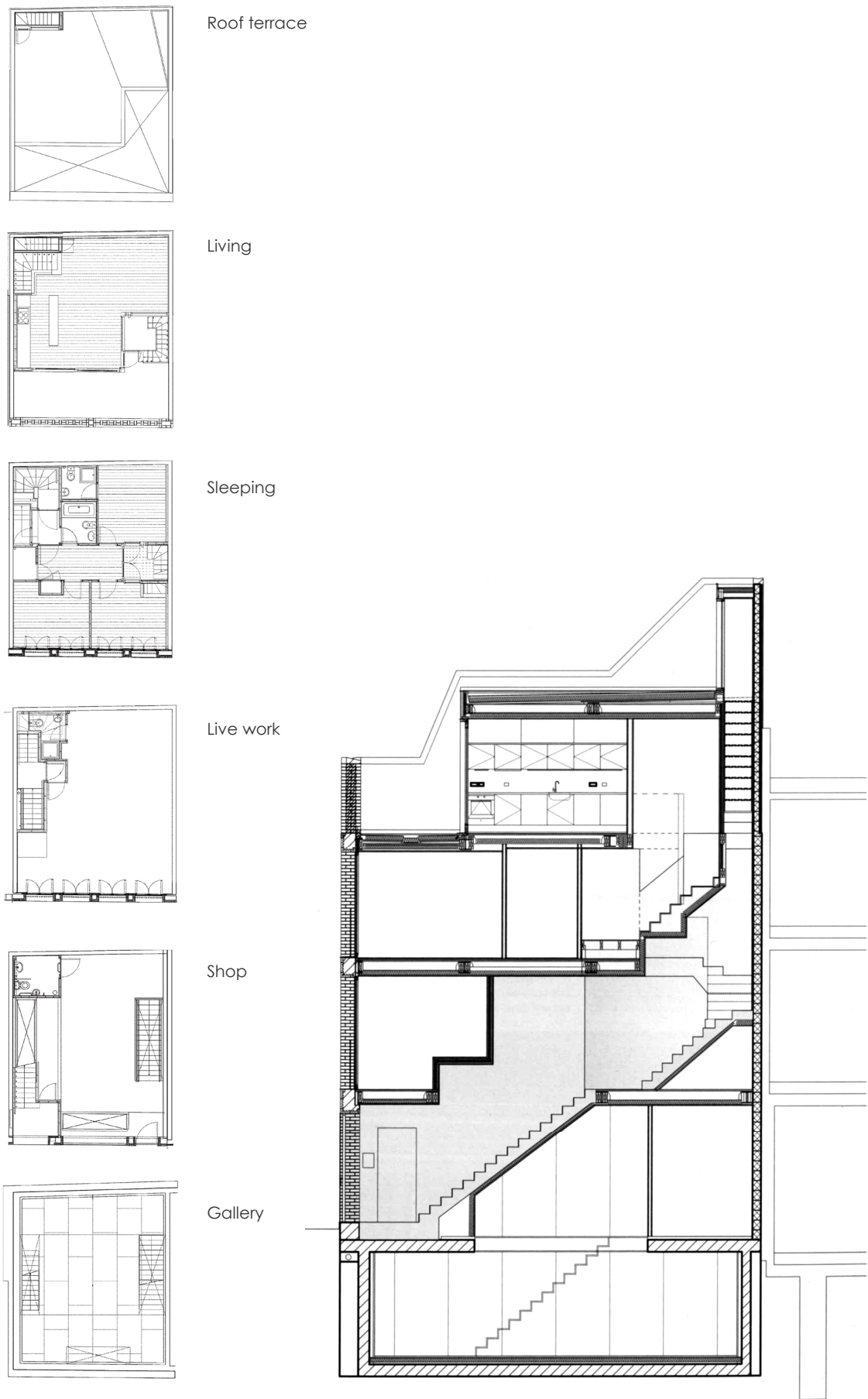


Fig. 5.33 Floor plans; Fig. 5.34 Section through House on Work

Materials and construction

The building is robustly constructed of concrete block with a dark-blue brick facade. The internal construction consists of a timber floor with steel beams, and plasterboard walls. The predominantly industrial feel of materials used in the construction contrasts with finishes such as the bronze balustrades and studded metal entrance door. The bronze nail-studded residential entrance emphasizes the privacy of this part of the building against the glass fronted showroom.

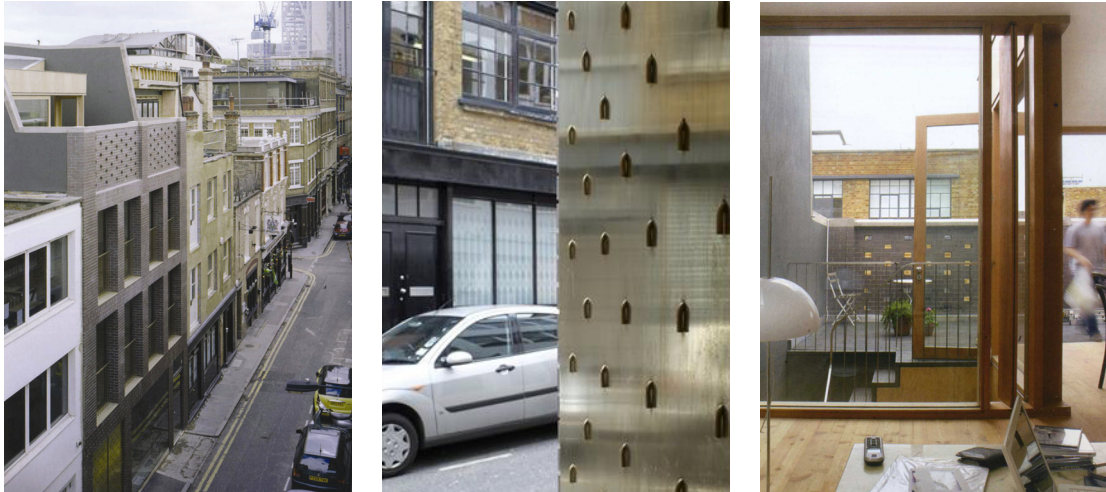


Fig.5.35 Street elevation; Fig.5.36 Robust metal studded door of dwelling; Fig. 5.37 Interior of living space with terrace

Environmental Issues

Daylight into the property is maximised despite the constraints of the site and the whole plot is utilised to its limit. Restricted by a lack of space on the site, sustainable 'adds on' are impractical but Stephen Taylor believes that 'at this moment when everyone is addressing the question of sustainability, the idea of making a habitable life in the core or the centre of the city is absolutely the right answer.'⁵⁰ The primary sustainable issues addressed in this scheme are the building program and the way in which the site conditions are exploited.

⁵⁰ Stephen Taylor, 'An Intimate Urban Ideal' in *Some Ideas on Living in London and Tokyo* ed. Giovanna Borasi (Baden: Lars Muller Publishers, 2008), p.117.

5.2.11 Summary

The contemporary case studies show variations in relationship of aspects of living and working in building form, dependant on types of work being carried out in the workplace dwellings. The case study examples don't appear to be dominated by location, but the immediate neighbourhood is an important factor in their positioning. The nature of work performed in the developments predominantly accommodates facilities for office, studio or gallery/shop space. These types of working environments do not demand very specific siting and spatial requirements can often be quite flexible. The case studies however demonstrate a consideration of physical environmental factors in design involving climate, siting and orientation. However these are not dominating factors in the designs, but are utilised where possible. The urban nature of the case studies means the sites possess much greater constraints than in the contemporary case studies of the individual rural house. Standard needs such as sufficient quality of light and space to carry out work is required and in some cases suitable access to the workplace for use by clients and a workforce is essential. This may need to be detached from the living quarters to retain a degree of professionalism. In the case studies, the various forms of workplace emphasise the range of spatial and organisational forms and layouts the types of work require, showing that the incorporation of work with living can often be quite flexible.

The case studies show how the two functions of living and working can occur alongside one another, with differing degrees of privacy of workplace in relation to the private home. The home office in the Accordia scheme is quite private and closely connected to the house. There is a diversity of semi private and private outdoor spaces at various levels of the terrace form which creates a disconnection between the studio and house to a degree. The Straw House and Quilted Office shows an example where the office is semi private and is secluded from the street, used by workers and invited clients. It also demonstrates how a shared space can be utilised to allow different occupations to operate in the same space at different times. The gallery or showroom in the House on Work is very public in comparison to the other projects, yet the living space above is very private. The precedents show a balance between the connection and disconnection of the two functions.

The different designs emphasise tensions between space, function, flexibility and cost. In terms of economy, both the Accordia scheme and the Straw House and Quilted Office are far from minimal in size and do not demonstrate exemplars for affordable housing. The House on Work however is much more modest in size, confined to a narrow and restricted site. The materials and form are also simple and restrained. The differences in scale of workplaces in the three case studies show how much space is required by someone working in a home study, as in the Terraced House with Studio by Maccreanor Lavington Architects, compared to a professional office in the Straw House and Quilted Office design. The House on Work highlights different requirements within a workplace, necessitating a public aspect to exhibit products as well as the need for a more private work space. The design and brief however is partly dictated by

the constraints of the site. This example also shows a much greater degree of flexibility of space compared to the Straw House and Quilted Office for example where spaces are more defined. All three dwellings are designed for open plan living, which allows flexibility in the way they are inhabited.

The precedents also highlight how functions and use can be distinguished through materials, form and spatial arrangement, to help identify work from living and public from private. This is clearly expressed in the house and office by Sarah Wigglesworth Architects through contrasting use of materials and form to distinguish separate functions of the building. These ideas however are much more subtly addressed in the House on Work where sizes of window openings, positioning of glazing and their arrangement on the facade are used to indicate the functions of the building within, while retaining a unity and simplicity of form. The door to the house next to the glass fronted gallery is nail-studded and made of bronze to differentiate the private dwelling from the public showroom. In the Accordia scheme, the variation of studio and deck dwelling types, breaks up the uniform rhythm of the mews to the backs of the terrace and also helps define the studios within the row. These more subtle methods of delineating functions are much more successful as they maintain pragmatism, in the spirit of the vernacular.

Despite the case studies not being consciously related to the vernacular, there are some principles found in the case studies that relate to those identified from studies in tradition that can be extracted to inform the model. The Straw House and Quilted Office is less relevant to the research than the other building studies, as it does not hold the fundamental principles observed in tradition, of simplicity, resourcefulness and economy of means. The examples however are valuable to cross examine against one another.

5.3 Principles

Leading on from studies of traditional workplace dwellings, based on variations of the cottage type and contemporary reinterpretations of live work, a number of key principles are identified to employ in the following design study. These principles are established by analysing the most fundamental influences to live work.

5.3.1 Model for design

The degree of significance of principles relating to live work is defined and illustrated in the hierarchy of needs diagram below, based on Maslow's hierarchy and using the principles determined in the operational framework in the methodology. The most fundamental needs are placed at the base and less significant factors towards the top. These are then related back to the operational framework through colour coding to determine the key influences that shaped the typology.

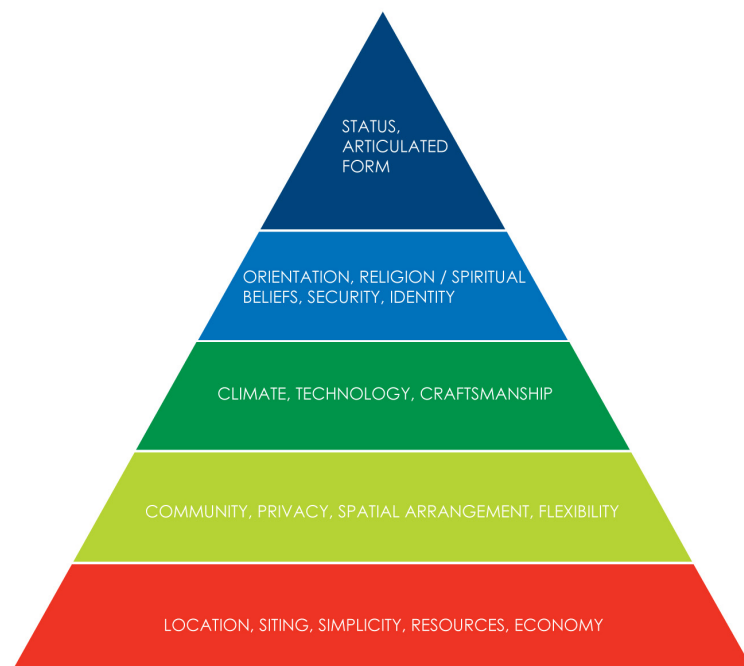


Fig. 5.38 Hierarchy of needs with the most significant needs at the base of the triangle

PHYSICAL	CONSTRUCTION	FORM	HUMAN	FUNCTION
LOCATION	RESOURCES	SIMPLICITY	COMMUNITY	ECONOMY
SITING	TECHNOLOGY	IDENTITY	PRIVACY	SPATIAL ARRANGEMENT
CLIMATE	CRAFTSMANSHIP	ARTICULATED	RELIGIOUS/ SPIRITUAL BELIEFS	FLEXIBILITY
ORIENTATION			STATUS	SECURITY

Fig. 5.39 Chart of influences affecting the live work typology relating to the hierarchy of needs diagram

5.3.2 Design approach

From the hierarchy of needs based on the working framework of principles, the most significant factors affecting the design of the traditional and contemporary workplace dwelling are drawn up to inform the subsequent design study. These are listed below:

5.3.3 Principles

- Location and siting
- Public and private
- Function and Flexibility
- Resourceful and economical
- Minimal

5.4 Design

5.4.1 Introduction

As identified by Frances Holliss and reiterated in the literature, contextual and case studies of tradition and innovation, there is a relevance to reintroduce the typology of workplace dwellings in design. This is because recently there has been a return to working from home and more flexible working patterns, as a result of improved communication and technologies. New house designs generally disregard the need for space to work and rooms are often designed neither specifically or with the potential for flexibly, forcing people to make do with the space they have.

The proposed site for the design study of a variety of live/work units is determined on a potential site for development in Pontcanna, Cardiff. The site is located in an area where there is a strong community of people working and living alongside one another. It has been proposed by Cardiff Civic Society that 'there is need for work/live spaces, particularly in this part of Cardiff. This site could possibly support an imaginative development of such a kind, large enough for both small businesses and small families. These could be appropriately combined with a limited amount of retail/craft/arts/health/fitness etc. spaces to add to those already there.'⁵¹

The pilot study identified a need to appoint a client in design studies to provide a more functional brief and to help determine details of the needs of the client/user. Housing developers proposing to develop the identified site for the study will act as clients for the project to provide direction on their focus on developing the scheme. This is principally one of economy, which is one of the principles identified to apply to design.

5.4.2 Brief

The brief is determined through feasibility studies of the site and discussions with the clients/ developers to propose suitable accommodation types and sizes. The brief for the design includes four small independent commercial units with shop fronts to the street and workspaces to the backs of the units. This aspect of the brief is live adjacent to work as the dwelling and workplace elements are contained in a distinct building within separate zones and their own entrances. The brief also consists of eight 1 bed duplexes with studio/office. The dedicated office/studio space to the fronts of these dwellings allows access for the public without creating disturbance to the rest of the home. There will also be opportunity for the duplexes to be combined vertically to provide larger three storey flats of 3/4 bedrooms with studio/ office space. This configuration is similar to 'live with' work homes as there is an internal connection linking the two uses. Three 2 bed apartments on the site and three private mews

⁵¹ Cardiff Civic Society <<http://cardiffpartnerships.wikispaces.com/file/view/Pontcanna+Pine+11-51.pdf>> [accessed 15 February 2013]

houses of 1/2 bed with the option for studio space will be accommodated. The programme provides a mix of accommodation with various degrees of connection between live and work places, with the opportunity of flexibility within them. The brief is designed for a variety of artisans and businesses involved in retail, art and design, making and small office based businesses.

5.4.3 Site



Fig. 5.40 Location of site in Cardiff in south-east Wales

The site for the proposed design of workplace dwellings is situated in the suburb of Pontcanna, west of Cardiff City Centre, on the site of a former pine warehouse. The area is the home and workplace of many artists, designers and makers, who sell their produce from their place of work. Many of the larger buildings particularly along Cathedral Road have been divided and converted into flats and offices.

Historic maps of Pontcanna show that the area developed dramatically around the turn of the twentieth century. In the 1880s the site was surrounded by fields and had yet to be developed. By the 1900s this area of Pontcanna, as the rest of Cardiff almost doubled in population and housing density increased and plots reduced in size. Since this rapid development, housing and street patterns have primarily remained the same, but new buildings have been constructed in infill sites around existing building on whatever spare land was available. Extensions increasing size of properties are evident and the warehouse was built, sometime between 1920 and 1940. The warehouse is currently being used as a gallery space pending development. Planning permission is granted to build 14 new apartments with 9 car parking spaces in a 'gated' community on the site. The current planning application has been fraught with objection from locals due to the lack of parking in the area. Housing both living and working on the same site should reduce the need for residents to own cars and so reducing this problem. The site is within walking distance to the city centre and there are many local amenities within the Pontcanna area.



Fig. 5.41 District of Cardiff highlighting site in relation to city centre; Fig. 5.42 Map of site in Pontcanna in 1880; Fig. 5.43 Site for the proposed design as it is today

Severn Grove to the west of the site is tree-lined and mostly residential, made up of terraced housing and intermittent blocks of flats. Along Kings Road and at the crossroads with Pontcanna Street and Sneyd Street there is a vibrant and sustainable community mix of retail, restaurants, offices and housing. Opposite the site, by the church is an alleyway leading to a cluster of artists, designers and makers studios and workshops. This artist's community contains a number of artists' studios, a microbrewery, a silversmith and jewellers, a joinery workshop, martial arts training studio, guitar maintenance workshop and a dressmaker.

5.4.3 Design approach and principles

- **Location and siting**

Critical to the design is the location of workplace dwellings so that types of businesses proposed would be viable in the area. This is similar to traditional workplace dwellings, situated for convenience of work and to gain passing trade. It can remain essential today, depending on the type of work being carried out. It may be less important for those businesses which rely on communications and the internet, but for many it is crucial to be located in the right place to gain custom. The scheme of artists, designers and makers' studios and workshops would operate alongside an already established community of artisans and a number of independent businesses. This provides a good foundation for new businesses to work alongside established workplaces, where there is already a viable market.



Fig. 5.44 Site plan 1:2000

The literature highlights how live/work can benefit communities, but also cause disturbances if not specifically designed. Working from home is considered a sustainable approach to urban living that contributes to local economies and creates livelier and safer environments to live in. Periods of activity are extended, enhancing security and the demand for local services and amenities invigorates the community.⁵²

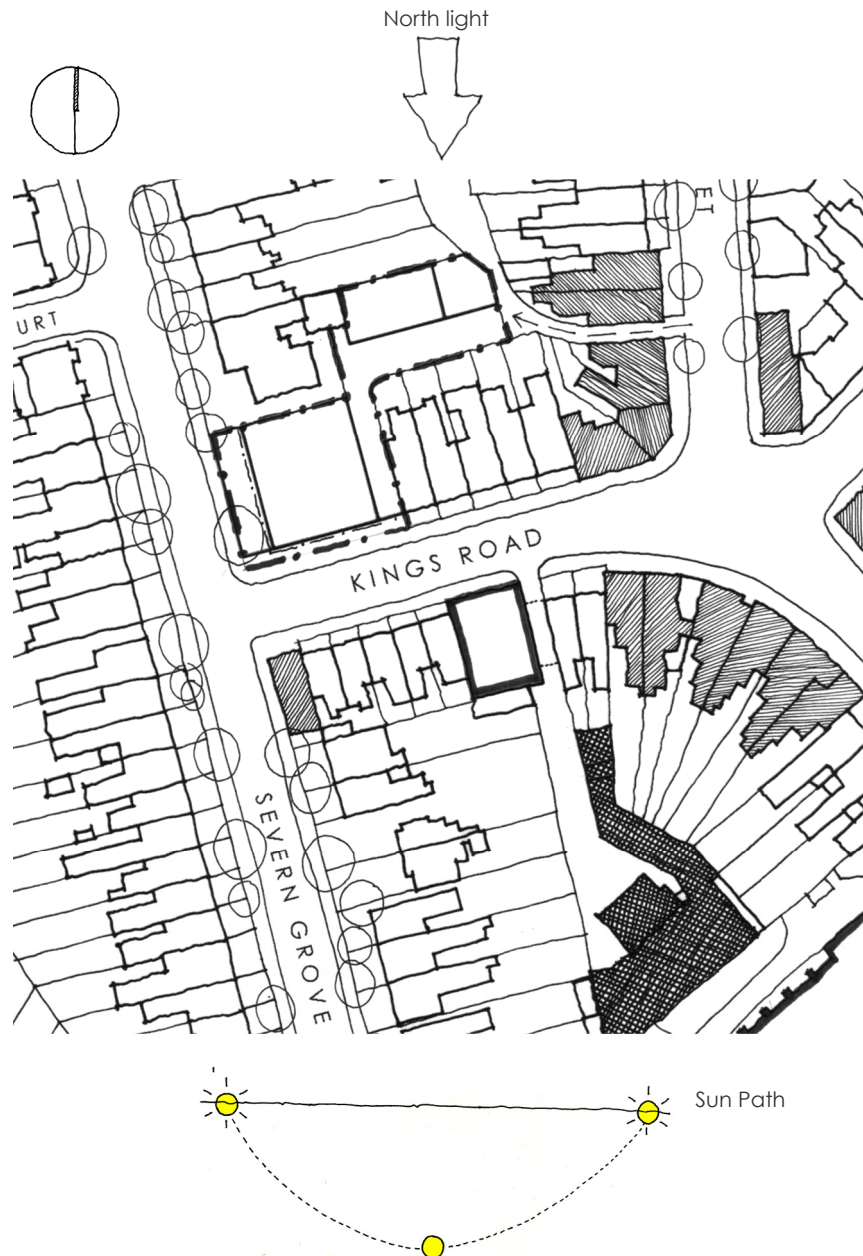


Fig. 5.45 Site analysis showing extent of the site, sun path and north light, access, and existing trees. Existing workplace dwellings are hatched and the studios are cross hatched 1:2500

⁵² Frances Holliss, 'Beyond live/work', *Planning in London*, 67 (2008), 22-24
<<http://www.planninginlondon.com/assets/PIL67%20UPLOADS/Holliss%20final%20pages%20pil67.pdf>>
[accessed 28 July 2010]

- **Public and private**

The design addresses some of the issues associated with live/work developments including the concern of public and private zoning. Within the live work typology it has been identified in the literature that there are various spatial arrangements and relations between workspace and living. The relationship between workspace and living, public and private is quite flexible within the design, depending on the type of work produced and the level of privacy a business needs.

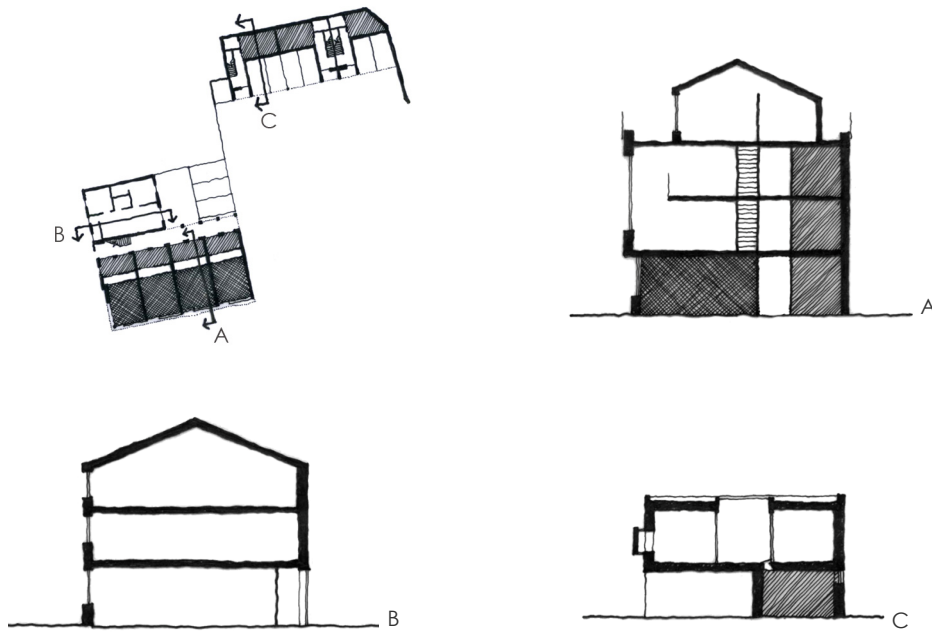


Fig. 5.46 Relationship between living and working in plan and section, no hatch – private, hatch – semi private, cross hatch – public

The ground floor shops on the main street offer artisans an obvious public frontage to display their work and attract passing trade, with space to meet clients. There is also space for a more private studio/workshop to the backs of the units. Above the shops are eight 1 bed duplex apartments with small studio/office spaces, accessed off outdoor balcony streets to the rear. These studio spaces are much more private, they are to the fronts of the apartments providing a buffer to the private living accommodation. The stair also helps divide these two functions. Accessed off the balcony streets, they provide a connection with other studios and access for visiting clients. There is also the option for these to be integrated vertically to create 3/4 bed apartments with office/studio space. It allows for the artisans to interact with one another on communal balconies and a courtyard off the workspaces. The three 2 bed apartments are primarily for living but have space for a home office desk in the living space. The three 1 bed mews with office/studio space to the rear of the site has the opportunity for the studio to be used as a second bedroom if required. These more private workspaces may suit professionals who require much greater privacy, such as a writer or illustrator, where contact with clients may be via the internet or away from the workplace. There are therefore workspaces for various types of professions including those where it is necessary for clients to enter the

workplace dwelling, where public and private must be separated to retain a level of professionalism and those that require a prominent shop front for display.

- **Function and flexibility**

The design allows flexibility and adaptability of varying peoples requirements. The duplex apartments are designed so they can adapt and be combined vertically in the future to gain another three extra bedrooms as the family unit expands.

Flexibility of space allows for more than one function to be carried out in the space. Open plan living optimises space and allows for everyday life to be more flexible. Similarly to cottage layouts, furniture is used to demarcate and divide rooms in the design, which are shared by a number of functions. They therefore provide multiple uses. Components that can be moved can enhance the efficient use of space and space can be defined dynamically and temporarily by folding and shifting.⁵³

The layout, functions and activities within the scheme are suggested by the form and articulation of openings. The King's Road elevation has large windows on the ground floor to act as galleries to exhibit activities or objects sold within. The double height living spaces in the duplex apartments have a single large window to disclose the spatial layout out within and to allow light deeper into the plan. The top floor living accommodation is set back from the primary building line and openings are smaller for privacy and to imply much more private residences.



Fig. 5.47 Composition studies of south-east elevation

- **Resourceful and economical**

In order to efficiently utilise the site, it is considered in terms of its maximum volume and space. Where constraints dictate parts of the site which may not be able to be developed or need to be set aside for another function, space was deducted to determine the potential site that

⁵³ Lydia Haack, John Hopfner, 'Microarchitecture – experiments in space optimisation', In *Detail, Small Structures: Compact dwellings, Temporary structures, Room modules*, ed. Christian Schittich (Basel: Birkhauser, 2010) p.14.

could be developed. The diagram below shows how space and form is created through site constraints. Site restrictions necessitate the building line to be set back from the street to provide a defensible space, provide access to the site, allow a mature tree to be retained, allow light into the plot through courtyards and provide a semi private pedestrian route to the courtyard. The maximum height of the eaves and ridge acceptable for planning was a constraint.

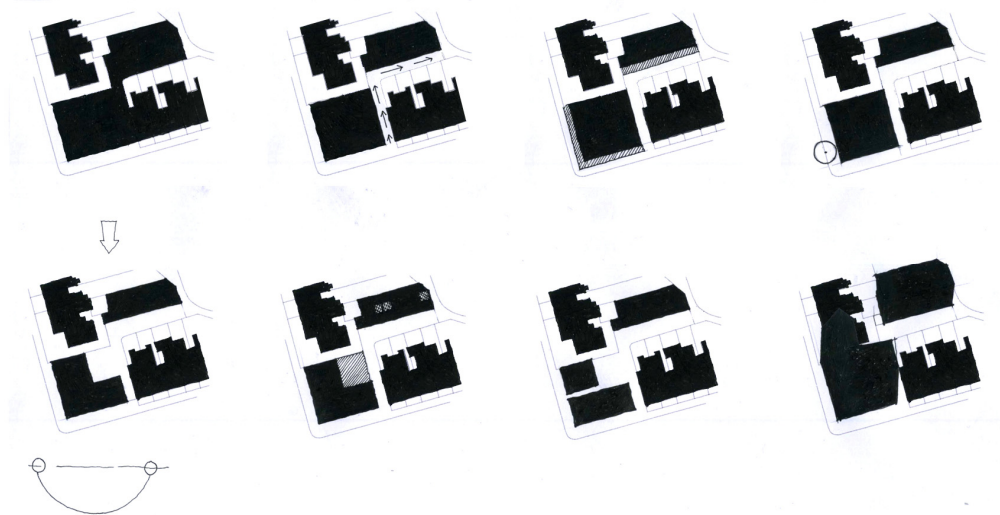


Fig. 5.48 Constraints diagram

The plot is exploited and optimised to take advantage of the constrained site. Restricted in height along the street an additional floor is set back from the building line which also allows for a small terrace on the roof top. The design is economical as the individual apartments are compact which allows a realistic number of flats to fit on the site. The compact nature of the development is cost-effective in terms of energy use and material cost.

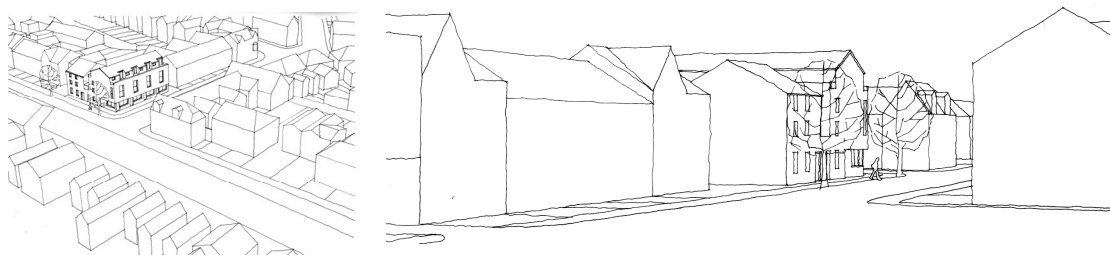


Fig. 5.49 Proposed building within the context of the site; Fig. 5.50 Proposed building within the street

The live work units are economical in size with the one bed duplex apartments with home office being either 48 m² for the upper duplex with outdoor amenity space and 54 m² for the lower duplex. This is around the London Design Guide space standards for a one bedroom two person (1b2p) flat, which is 50 m². The two bed apartments are of 63 m² and are much more compact than the 70 m² London Design Guide recommendations for flats of two bedroom four person (2b4p), however they don't waste space with circulation. The two

bedroom mews houses are 72 m² which are again lower than the standards for a two bed four person (2b4p) house of 83 m². By designing efficiently the apartments still maintain their quality, despite being smaller than guidance in the London Design Guide.

The suitability of the size and types of apartments proposed for the scheme was discussed with the developers of the site who helped to determine the viability of the scheme from their point of view as developers. The gross development value is analysed below for the proposed live work scheme, showing value if sold and if rented. The gross profit for the scheme would be substantial once the total sum of site purchase, legal fees, design fees, loans, build cost etc are deducted. These values were considered in 2011.

Residential- Gross Development Value						
Apartment	Type	Size (SQM)	Beds	Average Sales Value	Rent Per Annum	Rental Yield
Apartment 1	Duplex	53.7	1	£150,000.00	£7,200.00	
Apartment 2	Duplex	53.7	1	£150,000.00	£7,200.00	
Apartment 3	Duplex	53.7	1	£150,000.00	£7,200.00	
Apartment 4	Duplex	53.7	1	£150,000.00	£7,200.00	
Apartment 5	Duplex	47.5	1	£150,000.00	£7,200.00	
Apartment 6	Duplex	47.5	1	£150,000.00	£7,200.00	
Apartment 7	Duplex	47.5	1	£150,000.00	£7,200.00	
Apartment 8	Duplex	47.5	1	£150,000.00	£7,200.00	
Apartment 9	Apartment	62.6	2	£170,000.00	£8,400.00	
Apartment 10	Apartment	62.6	2	£170,000.00	£8,400.00	
Apartment 11	Apartment	62.6	2	£170,000.00	£8,400.00	
Apartment 12	Mews	71.8	2	£180,000.00	£8,400.00	
Apartment 13	Mews	71.8	2	£180,000.00	£8,400.00	
Apartment 14	Mews	71.8	2	£180,000.00	£8,400.00	
		808	20	£2,250,000.00	£108,000.00	4.80%
Commercial 1	Shop	40.5		£125,000.00	£8,700.00	
Commercial 2	Shop	40.5		£125,000.00	£8,700.00	
Commercial 3	Shop	40.5		£125,000.00	£8,700.00	
Commercial 4	Shop	40.5		£125,000.00	£8,700.00	
		970		£2,750,000.00	£142,800.00	5.19%

Fig. 5.51 Gross development value of residential and commercial aspects of live work

The materials chosen for the design are solid and robust to give an industrial/workshop feel to the form, whilst the brick used externally connects with the surrounding residential context of Pontcanna. The construction system decided upon is a hybrid of masonry - brick and block with a highly insulated cavity and concrete slab floors up to the second floor. SIPs panels clad in a metal are used on the top storey. The zinc clad OSB module could be prefabricated off site. The materials chosen are widely available and the construction systems are standard and would be able to be erected by local builders. The design is repetitive in elements and principally works to a standardised grid. Flat types are repeated down to the details, however there is opportunity for each dwelling/workplace to be individualised. The surface finishes would be minimal so the designers can decorate to their own preference.

- **Minimal**

The minimal form and arrangement of traditional cottage and workplace dwellings is relevant to draw on in contemporary design and in the current environmental and economic climate.

It is recognised that:

Issues such as climate protection and conservation of resources have resulted in a change in the image of architecture, which now seeks long-term sustainability and addresses the availability of raw materials and resources. We are faced with the challenge of devising solutions and concepts for our built environment that can be reconciled with these demands and limitations without any sacrifices in the quality of our building.⁵⁴

In addition, reducing the size of homes allows people on a limited budget to be able to purchase their own homes.

The apartments are compact in size in order to fit as many workplace homes on the site and make them as affordable as possible. An initial design was not dense enough and dwellings were large with too many bedrooms. It was recognised that the scheme is not ideally suited for large family homes. Discussions with developers highlighted that a number of smaller apartments would be more appropriate. The maximum possibilities of the site to function were exploited. The design comprises four storeys along the main street, where the highest surrounding buildings are three storeys. The design is very compact and the floor to ceiling heights are constrained in places. However the split level design with double height spaces has allowed for lower ceiling heights in places. The layouts make the most of the constrained plans, with minimal circulation space. A small flat that uses modest materials and is economical can be in fact more successful than a large scale apartment.⁵⁵ The effort to create spacious environments in minimal space leads to innovations in lighting, storage, space allocation and material selection.

In order for it to be possible to create a minimal space which does not also reduce comfort and convenience, 'every detail and every function requires particularly careful consideration, making use of every last inch.'⁵⁶ The design requires a degree of flexibility and versatility to enable space to be utilised efficiently. 'The minimisation of space should not be regarded in terms of its encapsulation but should achieve spatial quality through a varied and diversified sequence'⁵⁷, so the form is reduced to the essentials. To create a compact but useable space, understanding of human scale and functions of space is developed as the 'utility of space depends on the interaction between the user and the spatial structure'.⁵⁸ Due to the minimal nature of the design all furniture and fittings have to be planned in the design.

⁵⁴ Lydia Haack and John Hopfner, 'Microarchitecture – experiments in space optimisation', in *Small Structures: Compact dwellings, Temporary structures, Room modules*, ed. by Christian Schittich (Basel: Birkhauser, 2010), p.11.

⁵⁵ Azby Brown, *The Very Small Home: Japanese Ideas for Living Well in Limited Space* (Tokyo: Kodansha International, 2005), p.7

⁵⁶ Christian Schittich, 'The Fascination of Small Structures', in *Small Structures: Compact dwellings, Temporary structures, Room modules*, ed. by Christian Schittich (Basel: Birkhauser, 2010), p.9.

⁵⁷ Lydia Haack and John Hopfner, p.11.

⁵⁸ *Ibid.*, p.13.

5.4.5 Final drawings



Fig. 5.52 Site plan 1:1500



Fig. 5.53 Site model



Fig. 5.54 Ground floor plan 1:500



Fig. 5.55 First floor plan 1:500



Fig. 5.56 Second floor plan 1:500; Fig. 5.57 Third floor plan 1:500

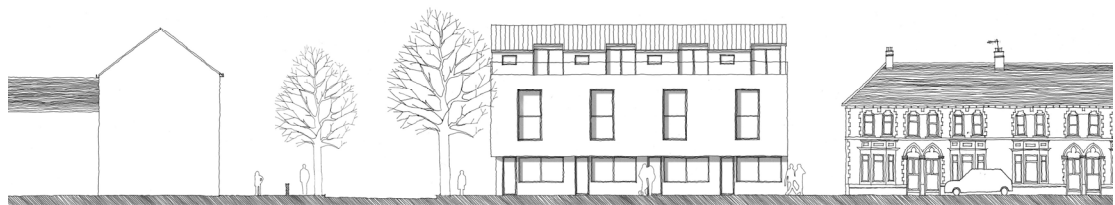


Fig. 5.58 South-east street elevation 1:500



Fig. 5.59 South-west street elevation 1:500

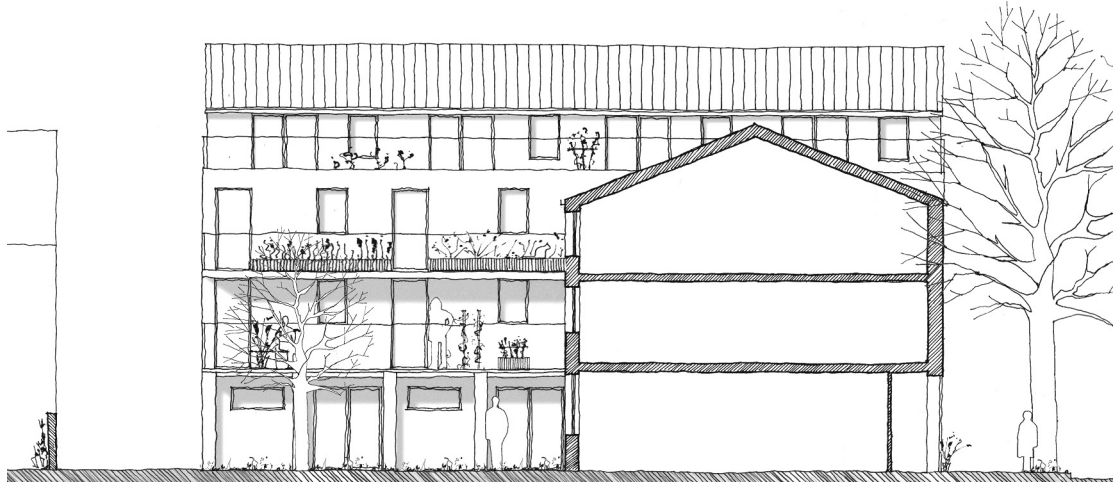


Fig. 5.60 Rear elevation of duplex workplace dwellings and section through apartments 1:200

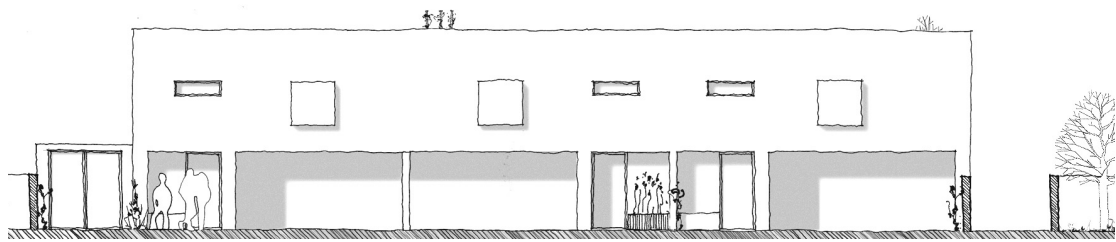


Fig. 5.61 Mews elevation 1:200

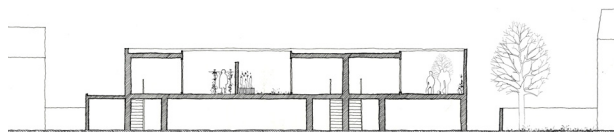


Fig. 5.62 Mews section 1:500

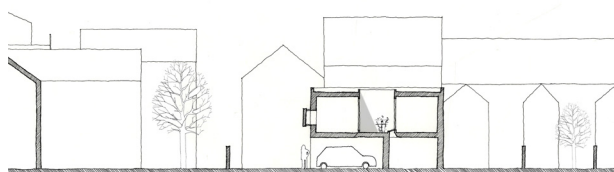


Fig. 5.63 Mews section 1:500



Fig. 5.64 Sectional elevation model of duplex apartments and shop on ground floor showing spatial arrangement

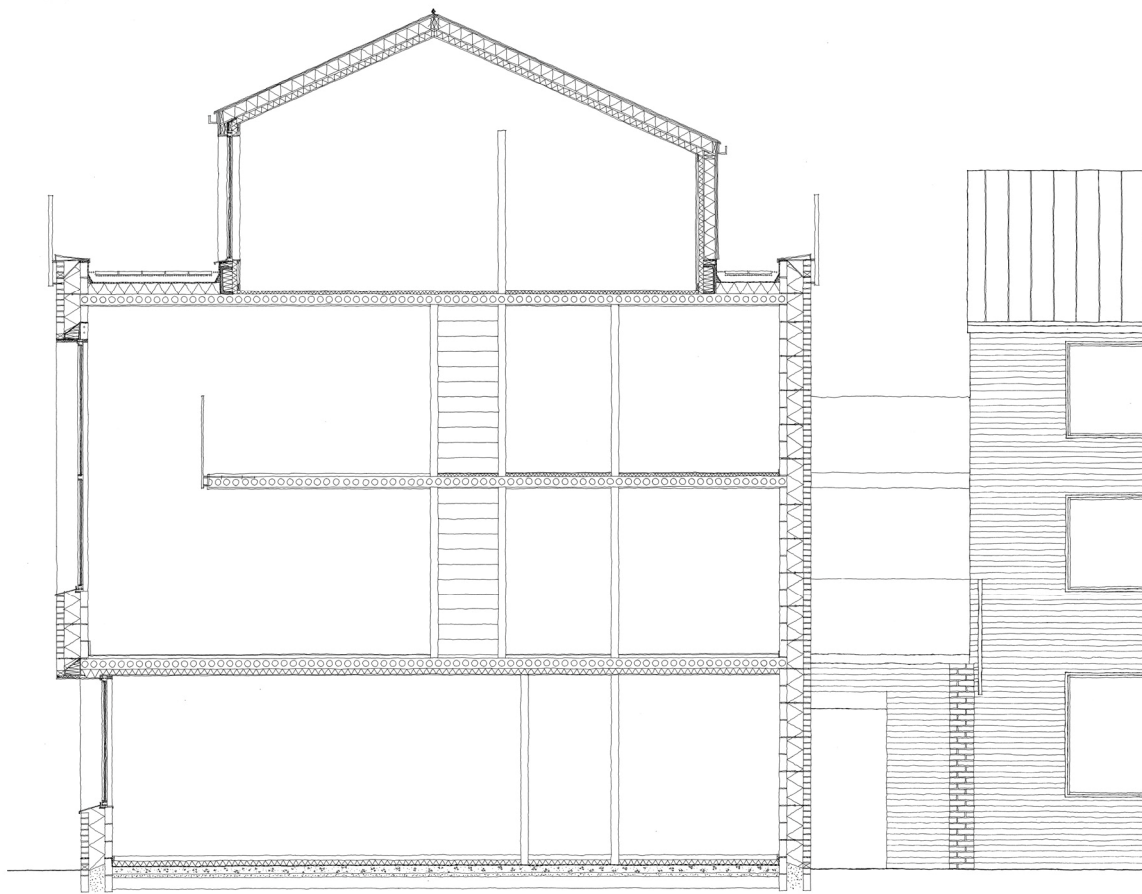


Fig. 5.65 Construction section through duplex workplace dwelling 1:100. The primary construction uses conventional building materials of facing brick, structural concrete blockwork and concrete slab floors. The cavity is completely filled with 2 layers of 100mm glass wool insulation batts which a thermal conductivity of 0.032W/mK. The large cavity means Teplo wall ties are required. The top storey is a prefabricated element made of OSB and clad in zinc.



Fig. 5.66 Sectional elevation model showing external material finish and plain interior shell

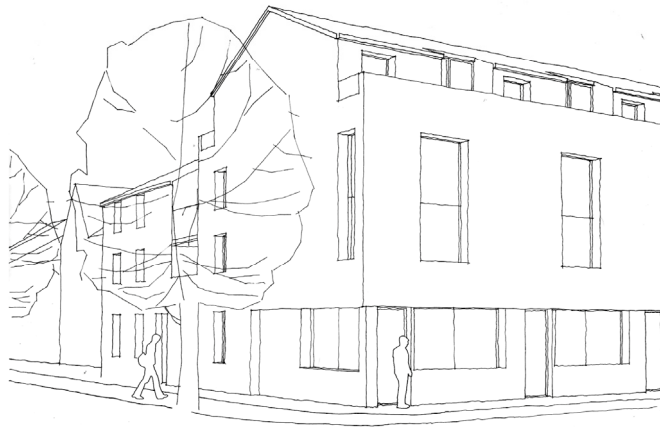


Fig. 5.67 Perspective view along Severn Grove; Fig. 5.68 View where Kings Road meets Severn Grove

5.5 Review, analysis and reflection

5.5.1 Introduction

Through analysis and reflection of design study 2, findings can be drawn from the model as an entity, in principles abstracted from the live work typology and also in the development of the model as a process from the pilot study. From analysis of the pilot study, the model was applied to design in this study in a slightly changed method. Each 'principle' was not applied to design as literally and was 'tested' much less strictly than in the first design. A more holistic approach to applying principles to design was taken. The design was worked up with the actual developers of the site to ensure that the brief in the revised model was realistically defined in terms of cost, functionality and density. A more defined brief and discussions with a 'client' in the study were both instrumental in the design, providing a stronger foundation to apply principles from tradition. The findings were determined in 'reflection in action' during the design study, with influence from the developers who offered their realistic and economic approach to building. Findings are also uncovered in 'reflection on action' in a concluding external review which involves analysis of commentary in literature and in exemplar building studies. Each 'principle' that was applied and tested in the design is analysed and findings for each discussed below. The process in which the revised model was applied to design is then analysed and reflected upon in the findings, with reference to the model as an entity. This is recognised to modify the model in order to move forward subsequent studies.

5.5.2 Design review through principles

▪ Location and siting

Critical to the design was the location of the workplace dwellings so that the types of small businesses projected for the scheme would be feasible in the area. This is similar to traditional workplace dwellings, situated according to location of business, resources and convenience of its workers. The scheme of studios and workshops, alongside residential accommodation for artists, designers and makers' would operate alongside an already established community of artisans. The site is within walking distance of many local amenities within Pontcanna and very close to the city centre.

The programme pragmatically suits the site and wider location strategically and socially. Physically however, the building could be viewed as an anonymous form in its location, which could be sited anywhere as it doesn't particularly feel tied to its place. The building does however follow the grain of the streetscape and subtly draws on the terrace typology which is prolific in Pontcanna. The articulation of the form fits amongst the surrounding buildings. Driven by economy and function, the building attempts to utilise the full extent of the site. It is set back slightly from the street in line with comparable surrounding buildings on corner plots, which project out a little from the rest of the row and are often larger in scale and height. The

primary street elevation is four storeys high, but the top floor within the roof space is set back from the façade to appear similar in scale with the surroundings. An existing tree on Severn Grove is retained to continue the rhythm of trees lining the street. The design however lacks green space to tie the scheme to its leafy setting.

Despite subtly connecting with the grain and scale of the surrounding environment, the building still appears as an object on the site, as the building does not connect to the minimal external space around it. The economy of the scheme has removed all 'redundant' external space to maximise space internally leaving a lack of semi private and private outdoor space. A large area of the site has been allocated to parking which is a critical issue in the area and has taken priority over outside amenity space. The scheme combining both living and working on the same site will however reduce the need for residents to own cars.

The absence of designed intermediate space between building and public realm has resulted in a lack of integration into the surrounding context, by not connecting these spaces through communal space. The London Design Guide suggests that all cities pose complex challenges 'of balancing density with sociability and diversity and a sense of place, so that development is appropriate and strengthens a community not imperils it.'⁵⁹

A more thorough site analysis could have helped form a deeper appreciation of the site and assisted in recreating specific characteristics of the context of the place, through a more sensitive understanding of the urban setting. This knowledge could then be used to create a response to the characteristics of place, community and the opportunities provided to the scheme by existing landscape, public space and buildings.

- **Public and private**

The design addresses some of the issues associated with live work developments including public and private zoning. The relationship between workspace and living, public and private are quite varied and flexible within the design, as differing levels of privacy address different business needs and types of work. The ground floor shops on the main street front offer businesses an obvious public frontage to attract passing trade to display their work and space to meet with clients. To the rear of the shops there is space for a more private studio/workshop, which can be used as a continuation of the main space. Above the shop frontages there are eight 1 bed duplex apartments with small studio office spaces off outdoor 'balcony streets' to the rear of the building. These studio spaces are much more private, they provide a buffer to the private living accommodation, while maintaining a connection with other studios and access for visiting clients off the 'balcony streets'. The design allows for the artisans to interact with one another on the 'balcony streets' and in the courtyard. Greater

⁵⁹ London Development Agency, *London Housing Design Guide: Draft for consultation* (London: London Development Agency, 2009)
<<http://www.lifetimehomes.org.uk/data/files/Reports/londonhousingdesignguidepdf1.pdf>>
[accessed 5 August 2011], p.6.

provision and design of this space would benefit the scheme. The three 2 bed apartments are primarily for living but have space for a home office desk in the living space. The three 1 bed mews to the back of the site allow an opportunity for the studio to be used as a second bedroom if required. These would be notably more private workspaces. There are therefore workspaces to suit professionals who require much greater privacy such as a writer or illustrator, those where it is necessary for clients to enter the workplace dwelling, where public and private must be separated to retain a level of professionalism, and those that require a prominent shop front to display the business.

The scheme therefore provides a complex hierarchy of public to more private units at a strategic planning level within the built form. As mentioned above, this is not continued beyond the threshold externally to include the immediate surroundings and connection to the public realm. A more balanced provision and range of outdoor spaces would address the hierarchy of public, communal and private, to connect with built form. Further development of this would assist in the creation of form associated with context and placemaking to construct a hierarchy of spatial experiences.

- **Function and Flexibility**

As discussed there are various types of live work units on the site, all fulfilling different functions and providing flexibility through varying degrees of openness to the public street. Function has driven the design, intensified by economic restraints, which have determined the form to some extent. These constraints have pushed a clear organisation of space and structural arrangement within a compact area.

The design of the duplex apartments allows for the option of two apartments to be integrated vertically creating 3 or 4 bed apartments with office/studio space to accommodate the full height of the terrace, excluding the work unit on the ground floor.

The surface finishes internally are left in their raw state to enable inhabitants to finish them to their own preference. The materials used in the construction are revealed and create an industrial, workplace quality. For example the block work could be painted internally and not plastered and the concrete floor simply polished, similarly to the way the construction and materials were left exposed in traditional Welsh cottages. Ansgar and Benedikt Schulz explain that,

Accurately laid brickwork costs less than a plastered wall and saves on further finishing work. The strategy “building shell = building finish”, however, creates a cost advantage only if the aesthetic standards of a bare structural shell are actually applied.⁶⁰

⁶⁰ Ansgar Schulz and Benedikt Schulz, 'Simply Reasonable' in *Building Simply Two: Sustainable, cost-efficient, local*, ed. by Christian Schittich (Munich: Edition Detail, 2012), pp.39-40.

The advantage also of using brick/masonry is that it is fairly simple and inexpensive and does not require non standard technology for construction. The materials selected are durable and robust and necessitate little maintenance. Using brick and block, with the opportunity of reusing some of the red brick of the existing warehouse was decided upon for functional and economic reasons. The local tradition of using split stone would not be viable for the project, however in the detailing of the construction, characteristics of the surrounding terraces could be incorporated in innovative ways.

Many elements of the design are repetitive and use standard components. Flat types are repeated down to the details, however there is opportunity for each dwelling/workplace to be individualised as the internal form has been left as a plain space, exposing the textual surfaces of the raw construction materials. The surface finishes are minimal so the designers can inhabit and decorate their space to their own preference.

- **Resourceful and economical**

As economy has been a primary focus of the scheme, many aspects of the design have been affected by the desire to ultimately generate a proposal that is affordable. Economy is referred to in the previously discussed principles, as it has affected decisions relating to many aspects of the design. Economy has also impacted on the decision to design to a minimum, which is explained in the principle below.

The design has been pushed to contain the maximum units practically possible on the site, by using the full extent of the site and designing very compact units. The compact nature of the development is therefore cost-effective in terms of energy use and material cost. The build also uses fairly standard construction techniques. The brick and block walls with a highly insulated cavity could be constructed fairly quickly, with the concrete floor slabs and fourth storey zinc clad SIPs module prefabricated and then brought to site.

Ansgar and benedikt Schulz state that the 'success of a project depends upon having a proper balance between the three sides of the magic triangle – factors of time, cost and quality. If one factor is too dominant, the others suffer.'⁶¹ Too much emphasis on economics in the project has impacted on the lack of communal outdoor space, however at the same time the tight budget has created innovative architectural solutions such as in the spatial efficiency in the scheme. It has helped to focus on the essential aspects of the design.

⁶¹ Ibid., p.35.

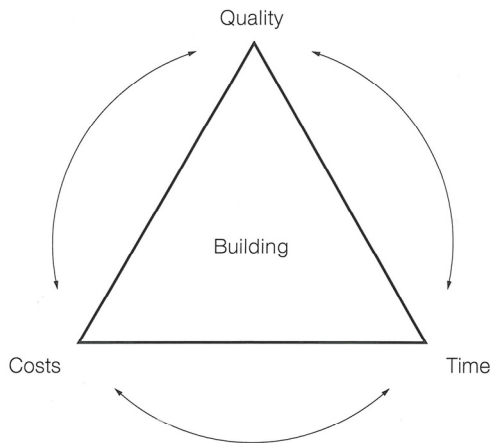


Fig. 5.69 The magic triangle of building

- **Minimal**

The apartments are compact in size in order to fit as many workplace homes on the site and make them as affordable as possible. Initial designs were not dense enough and dwellings were too large, containing too many bedrooms. It was established that the workplace homes in the context of the site would not ideally be suited to large families. The developer's requirements instead revealed that a high number of smaller apartments were desirable. The design of the duplex apartments does however allow for flats to be integrated forming larger homes. An approach to make use of the entire site was adopted by developing the form through taking space required for circulation, light, communal space, planning issues etc. away from the extent of the site so the remaining space could be developed, as opposed to building form up on the site. This utilises the maximum possible volume of the site to still function.

The split level design and use of the pitched roof space creates spacious living areas in contrast to the more intimate sleeping spaces where ceiling heights are able to be relatively low. The duplex flat types interlock in order to accommodate more flats. Through interconnecting they create a richer space within the flat types, building on the terrace typology. Ansgar and Benedikt Schulz state that 'Building compactly is a possible strategy. The resultant reduction in area and space must be compensated for by the design'⁶² In order to achieve such a compact design, more time had to be spent on working on the spatial arrangement. Christian Schitten describes how 'When space is a rare commodity, every detail and every function requires particular careful consideration, making use of every last inch.'⁶³ 'Space optimisation follows Mies van der Rohe's principle of "less is more", not through a reduction to less but a reduction to the essentials.'⁶⁴

⁶² Ibid., p.39.

⁶³ Christian Schittich, 'The fascination of small structures', in *Small Structures: Compact dwellings, Temporary structures, Room modules*, ed. by Christian Schittich (Basel: Birkhauser, 2010), p.9.

⁶⁴ Ibid., p.11.

The design allows for a degree of multifunctionality of space to accommodate the minimal nature of the units. Studio spaces can also be used as bedrooms and the living spaces are open plan using space more efficiently. 'The compression of space calls for an exact understanding of human activity in space with the view to reorganising the interspatial functions.'⁶⁵ Spaces are designed to a level of detail so specific activities can take place in them and suitable furniture specified. It is therefore critical to understand the interaction between occupant and place.

The minimal nature of the scheme is also carried out in its simplicity of form and aesthetic. This is fulfilled in part, but some areas of the scheme contain a much greater degree of complexity. Economics and a need to provide as much accommodation on the site as possible are at the expense of simplicity. For example the form of the roofscape of the duplex apartments is complex as the form projects in and out to provide a small space to sit outside, without compromising too much space internally. The compactness of the design has forced the form to be shaped in a certain way, which has reduced the simplicity in order to accommodate the optimal space both internally and externally.

⁶⁵ Linda Haack and John Hopfner, 'Microarchitecture – experiments in space optimisation', in *Small Structures: Compact dwellings, Temporary structures, Room modules*, ed. by Christian Schittich (Basel: Birkhauser, 2010), p.12.

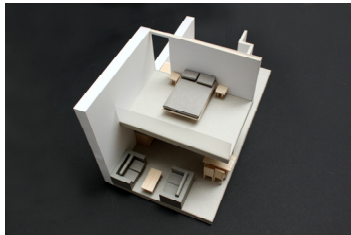
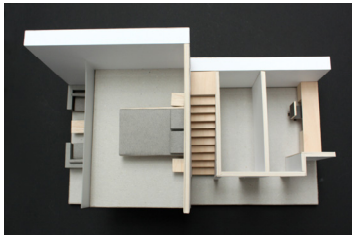
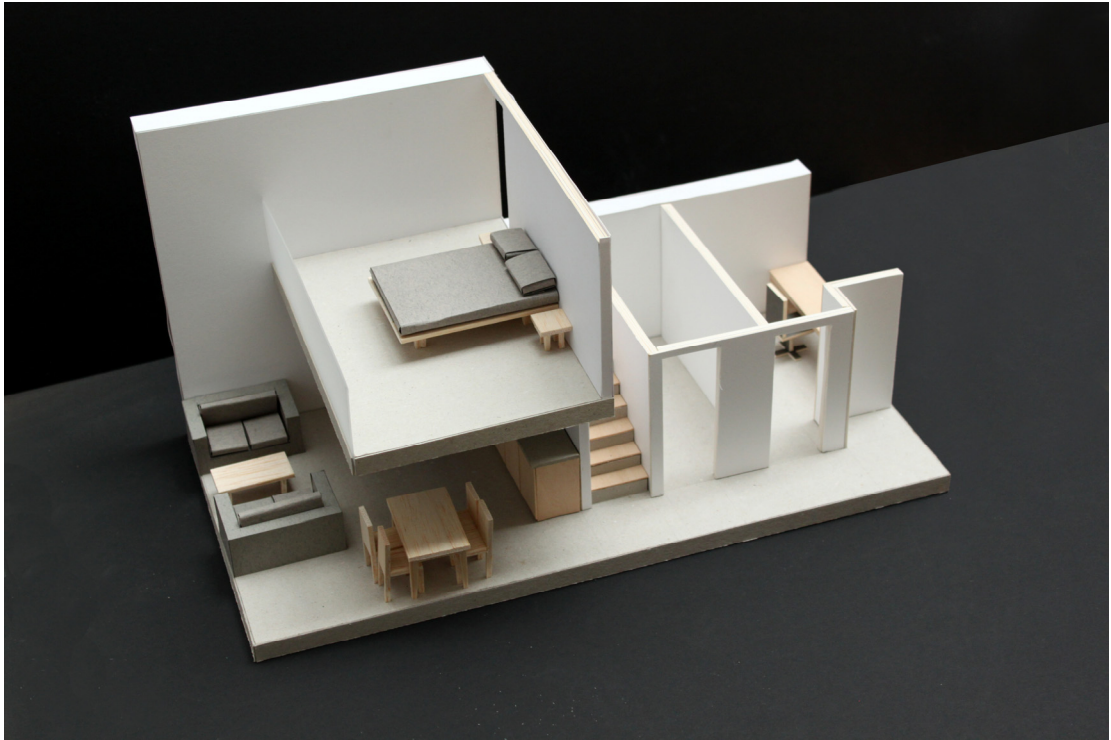


Fig. 5.70 Final piece to demonstrate the minimal and functional nature of the duplex apartment and the economical and efficient use of space

5.5.3 Findings

In this design study, it is consequently identified that the model as an entity has changed slightly from the pilot study, as the model for live work demonstrates a different set of principles which are instrumental to the type, compared to those identified in the individual rural house. Within the general framework of principles some appear more instrumental than others to the two different house types. The process in which the model was employed has also been modified and the findings relating to its progression in this study are analysed below, with reference to the model as an entity.

Firstly the model involved the study of traditions of the cottage type, concentrated on work related activities that were conducted in and alongside the dwellings. In order to carry out this research it was necessary to study information on the cottage from an architectural history background and also from a social history background, to include knowledge of Welsh crafts and other work functions, which were carried out in or nearby the cottages. The need to do this was because there is little reference to the work which took place in cottages in literature. Surviving examples where work related activities took place are unidentifiable, from those where it did not. The research into the tradition of live work is therefore drawn predominately from different types of literature and from examples found at St Fagans. Wide variations in the live work type and a lack of really detailed information on the typology, has resulted in principles drawn from tradition being much more abstract. The literature however addresses the way the dwellings were used and the social aspects of living in much more detail than the previous pilot study, which appears to be increasingly important to the model.

In parallel to traditions of live work in Wales not being identified as a type in literature, a contemporary equivalent is also not established and there are no examples in published literature. They can however be found in the rest of the UK, but these examples are not acknowledged to have been designed with reference to tradition. Despite this, they still provide a range of approaches to design which relate to ideas found in tradition. The degree of this depends on the individual case studies. Generally, contemporary precedent studies become more relevant in this study from a conceptual dimension and also in subtle intricacies of design.

In the formation of the new model, it is recognised that influences on the typology have changed from the previous model. A number of principles that were critical to the form of the longhouse were much less influential on the cottage and priorities of design are different. From the modified hierarchy of needs, a set of principles was established from the literature and contextual study of tradition and innovation. Significantly this set of principles for design is predominantly different, but with some commonalities with the longhouse.

A brief was then formulated for the design study, with the assistance from developers of the proposed site, who adopted a client's role in the study. It was identified from the findings of the

pilot study that a client would be beneficial in the process to assist in formulating a brief and to provide advice and direction for the design. This would make the design methodology more realistic for the purpose of testing the model. This was a significant addition to the process as it meant that other factors affecting design were addressed including, planning restrictions, regulations and costs. The guidance given by the developers was useful, but it drove the design to be considered with economics at the forefront, because this was the clients' primary objective. This meant other principles became much less important at the expense of costs.

The urban site for this design provided many more constraints than the previous site. Solutions to them provided direction for the design. Fewer constraints in the individual rural dwelling design made it much harder to focus the study. This meant that many more outside influences affected the model than with the previous design, which is important to acknowledge in the model.

Principles were applied to design much more openly, allowing principles to be interconnected and considered together, rather than in isolation of one another, which revealed to be problematic in the pilot study. The design process was carried out in a similar way to the pilot study involving a number of site visits to analyse the place, followed by initial design studies which led to a final design. It was recognised that a more thorough site analysis was required beyond the physical conditions of the climate and surrounding building form and landscape features, but to include a deeper study of the subtle intricacies of the place. This was identified as necessary because on reflection, it was noted that the building form was not specific to its place.

One of the principle reasons this design is more successful than the pilot study is that there was a more defined brief and the opportunity to discuss issues with the developers of the site. The site also brought with it constraints that needed to be addressed alongside the consideration of the defined principles. The principles were much more loosely followed which resulted in an integrated response of issues in the design, rather than ideas that contradicted one another. The elements of tradition applied through the principles were abstracted and translated in the design very conceptually. This generalisation of principles however has resulted in some of the specifics and details from tradition being lost.

The design study also highlights that some design principles are much more instrumental to live work than others, and these can be compared against the individual rural house in the pilot study. Due to the changed emphasis of the typology and the more complex brief and urban site, the design reveals much greater focus on how people use space and connect with the wider community. Therefore the relationship between public and private becomes more important and how the type functions as a whole and also in the function and flexibility of spaces within units. This also relates to the resourceful and minimal nature of the forms. Location and siting remains significant in terms of the relation to businesses and neighbourhood, but factors of climate and orientation are much less significant, compared to

being fundamental to the longhouse. This demonstrates how primary influences of tradition on buildings change and so the model adapts to different situations and contexts.

6.0 Terraced housing

6.1 Introduction

This third design study addresses affordable terraced housing and it is based on traditions of workers' houses. This housing type is a prominent and remaining feature of the industrial landscape of Wales and terraces still surviving today make up a considerable amount of inhabited dwellings in Welsh towns and cities. They are valued as they are conveniently located at the heart of close knit communities.¹ The significance of the terrace form in addressing current housing needs has been recognised by many contemporary architects who have re-appropriated the type in new design. Daniel Rosbottom in the *Architects' Journal* discusses that:

'The rehabilitation of the street as an idea has, in recent years prefaced the return of the terraced house. It has become clear that providing high-density, small-scale apartments in existing town centres does not reflect the diversity of housing need. In our peripheral vision stands the family house, and beyond that suburbia. It is to these conditions, too long ignored by architects, that we need to turn our attention.'²

He urges for terraced housing to be reconsidered and revived in design. In terms of affordability, terraced housing is understood by Andrea Wiegelmann to be a 'cost-effective and more ecological alternative to detached single-family houses, more affordable even for young families'³. She acknowledges that there is a return to people wanting to live in urban centres, including young people and professional couples, families and elderly and that the terrace offers 'these people the possibility of combining the wish to live within one's own four walls with the advantages of inner-city living.'⁴ The terrace typology is therefore significant to study as it can provide a suitable resolution to housing requirements when reconfigured to today's living needs and standards.

Terraces of houses were built in the eighteenth and nineteenth centuries in Wales to house immigrant workers of the new industries close to their workplace. The earliest terraces are most relevant to the study as their roots lie in vernacular traditions. Many of the oldest of these dwellings have been demolished and those which have survived have undergone extensive change to comply with today's living standards and building regulations. There is often little appreciation of early industrial rows of houses, due to the physical hardship and social oppression associated with these houses, often instigated by industries' owners and managers.⁵ However 'these dwellings are significant today because they provide evidence

¹ Cadw, *Industrial Workers' Housing in Wales: Care and Conservation* (Cardiff: Cadw, 2005) http://cadw.wales.gov.uk/docs/cadw/publications/Industrial_Housing_EN_CY.pdf [accessed 8 June 2010]

² Daniel Rosbottom, 'We now have an opportunity to reflect upon how terraced housing can be reinvigorated', *Architects' Journal*, 226.14 (2007), 26-30 (p.26).

³ Andrea Wiegelmann, 'Living in Terraced Housing' in *Semi-Detached and Terraced Houses* ed. by Christian Schittich (Basel: Birkhäuser, 2006), pp.8-13 (p.9).

⁴ *Ibid.*, p.9.

⁵ Cadw, *Industrial Workers' Housing in Wales: Care and Conservation* (Cardiff: Cadw, 2005) http://cadw.wales.gov.uk/docs/cadw/publications/Industrial_Housing_EN_CY.pdf [accessed 8 June 2010]

for the social, economic and cultural history of the majority of inhabitants of Wales from the later eighteenth century onwards.⁶ Early industrial workers housing has been demolished in many cases due to poor space standards, construction, sanitation, ventilation and inadequate light levels. Despite these issues which are important to acknowledge, there are a number of positive aspects and lessons that can be taken from the traditions surrounding this typology and the way it developed. Reinterpretations of these principles are relevant to design of the contemporary terraced house.

⁶ Ibid.

6.2 Literature and contextual study

6.2.1 Tradition of the terrace

Up until the mid 18th century manufacturing industries were small and work predominantly took place in cottages as discussed in the previous chapter. As these small industries were replaced by large scale factory systems during the industrial revolution, workers' dwellings changed too and were required in much greater numbers. The early industrial workers' terraced houses however were not dissimilar to crofters or cottage dwellers homes but were sited together in rows. Initially the terraces were built on rural cottage and farmhouse traditions, often constructed in a similar way using available resources on unproductive land or on unenclosed commons.

The study therefore specifically examines early industrial workers' housing from 1775-1875, which have their origins in vernacular traditions, based on examples from the book *Welsh Industrial Workers Housing 1775-1875* by Jeremy Lowe. The early terrace developed from Welsh rural farmhouse traditions and the typology evolved to inform later terraces that have become distinctly characteristic of the industrial landscape of Wales.

The study will refer to a number of examples of early industrial workers' housing predominantly from the industrial areas of south Wales connected to the coalfields and iron ore mines and also north-west Wales where slate quarries were prominent. These were the major centres of industry and development. The study will concentrate on research into Gellideg and Rhydycar located near the town of Merthyr Tydfil as a specific type and layout of terrace of particular significance and application to the study. The research will also address aspects of traditions found at Stack Square and Engine Row, Blaenavon; Triangle, Pentrebach, Merthyr Tydfil; The Ranks, Abercarn and Nant Gwrtheyrn, Llyn Peninsula, North Wales, amongst others. They are chosen as they display a variety of forms and approaches to develop a wide scope of understanding of the typology. This is only a selection of numerous examples of workers' housing built up until around 1875. After this time terraced housing was predominantly constructed in the major industrial centre of south Wales and the north-east.

6.2.2 Characteristics and principles

Characteristics and principles analysed from traditions of the terrace typology and particularly from early industrial workers' housing are recognised and categorised under five main headings acknowledged in the methodology. These are the physical environment, construction, form, human and function. Principles and characteristics are presented below in these categories.

Physical Environment: Climate, siting, orientation

Terrace settlements developed predominantly around the coalfields and iron ore mines of South Wales and the slate quarries of North West Wales. Metals were also mined in clusters across Wales and the distribution is illustrated below:

Iron and coal - South Wales – Swansea,
Heads of the Valley area
Slate – North West – Snowdonia
Lead – North - East and Mid Wales
Gold – Dolaucothi and Dolgellau
Copper – Anglesey and Swansea



Fig. 6.1 Distribution of coalfields and slate quarries in Wales

The siting of terrace houses was principally dictated by industrial convenience, the dwellings were within walking distance of occupants' work. The designs were governed by industrialists' desires and there were at first no regulations enforced by authorities. However many of the early industrial houses draw more on the farmhouse methods and were well built and designed with consideration of site and climatic conditions. Plan arrangements and construction methods were designed by local builders, familiar with traditional practices of the district. The industrial nature of the early houses is largely evident by the way they were grouped. As settlements developed, scattered rows of houses gave way to parallel rows then streets of terraced houses, and in some places grid layouts and even geometric plans were devised.

The following diagrams illustrate the siting of early industrial workers' housing identified as examples for study. They demonstrate the various methods of siting and settlement patterns with regard to orientation and context of the sites.

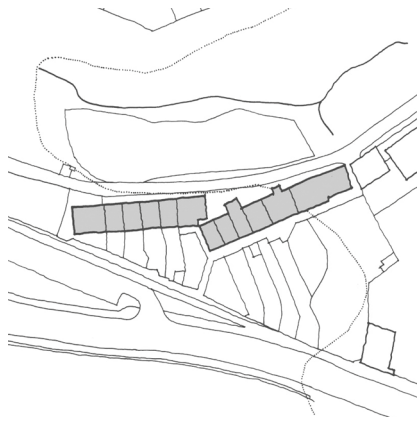


Fig. 6.2 Gellideg, Merthyr Tydfil

The original farmhouse (the end house in the lower row (right)) predates the opening of the Cyfarthfa works in 1765 and the upper row was built in 1813.

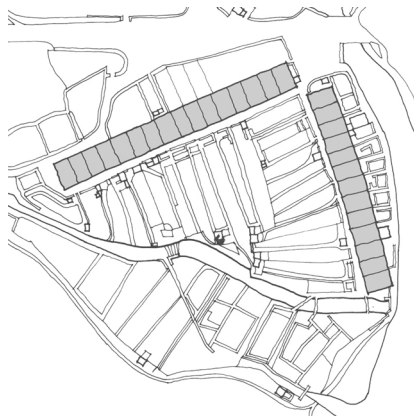


Fig. 6.3 Rhydycar, Merthyr Tydfil

Rhydycar was built around 1795. Five of the houses have been relocated and rebuilt at the National Museum Wales at St Fagans and the others demolished.



Fig. 6.4 Stack Square and Engine Row, Blaenavon

The terraces were built between 1789 and 1792 and have been restored as part of Blaenavon World Heritage Site.



Fig. 6.5 Triangle, Pentrebach, Merthyr Tydfil

The triangle was built between 1840 -1852 for the Plymouth Ironworks and is an example of Georgian planning. It is formed around a communal central space and each dwelling has a small front yard. It has since been demolished.



Fig. 6.6 The Ranks, Abercarn

The model settlement of 56 four roomed houses for Abercarn and Gythen Colliery was built between 1847 and 1850. The design addressed issues of public health with paved streets, sewers and refuse stores, however the houses were inflexible with rooms of the same size and there were no private gardens or public spaces. They have since been demolished.

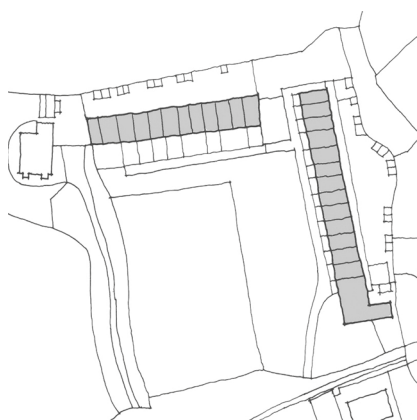


Fig. 6.7 Nant Gwrtheyrn, Llyn Peninsula

The former quarrying village in north Wales was built in 1878. The houses have been restored and are used by the Welsh Language and Heritage Centre now located there.

The layout of houses and terrace rows of this small sample of early industrial workers' houses highlights the variations in settlements. Gellideg and Rhydycar show a similar pattern of arrangement. The fronts of the dwellings face towards the south, and are accessed off a narrow street where opposite strips of land are divided up to serve as allotment gardens for each dwelling. To the backs of the dwellings at Rhydycar which face towards the north there are small rear yards. The terraces at Nant Gwrtheyrn also comprise a similar plan form to this, in an L-shape creating a courtyard facing south as at Rhydycar. The settlement and layout of these examples are significant to the study as they reveal a consideration and connection to the physical environmental conditions of the site amongst other issues valuable to the study. The design of terraces at Stack Square, the Triangle and The Ranks show less consideration to factors relating to climatic issues and the physical landscape over more economically determined and planned configurations.

Construction

The characteristics and building styles of early terraces throughout Wales varied where locally available materials specific to a place were still used to determine the construction. The first terraces continued to be built of a simple form and straightforward construction, typical of vernacular buildings and using local resources at the outset. 'Many of the early industrial houses draw more on the farmhouse methods than on those used for the cottages; they are well built, differing from the farmhouses only in a few imported details.'⁷ They were solidly built and more durable than the cottage methods of rough walling and thatch. However as the industrial revolution progressed durability of houses became less significant as industries increased in scale and economy required cheaper materials with less need for skilled craftsmen.⁸ New technologies and improved transport led to later terraces incorporating materials imported from further afield. Forms were efficient of space and resources as they were overseen by industrialists' economically driven requirements.



Fig. 6.8 Materials used to build Nant Gwrtheyrn quarried from the mountainside in a remote and inaccessible part of the Llyn Peninsula

⁷ Jeremy Lowe, *Welsh Industrial Workers Housing 1775-1875* (Cardiff: National Museum Wales, 1994), p.4.

⁸ *Ibid.*, p.5.

The walls of terraces were built of local stone for some time before bricks were introduced and were used for jambs and heads of window and door openings and quoins at the corners of buildings. Eventually they were used throughout as they were easier to lay than stone.

Terraces were built either along the contours of the land or down the valley sides depending on the land available to build on. Houses built down the slopes were constructed with stepped roofs in the steepest places or built sloping parallel to the ground where the lie of the land made it possible as a more economical option.

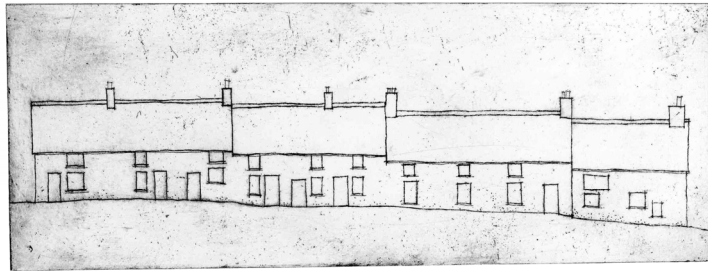


Fig. 6.9 Roofs built parallel to the landscape at Nant Gwrtheyrn for ease and economy; Fig. 6.10 Stepped roofs at Gellideg

Form

Industrial workers housing was built primarily to increase business profits rather than satisfy the tenants' needs and was therefore minimal in size. In early examples of workers' housing, the dwellings are compact in size and are sited in quite isolated locations, resulting in greater availability of land around them. Terraces built much later were commonly more spacious internally as space standards and legislations were introduced. The houses are also simple in form in parallel with vernacular dwellings throughout Wales.



Fig. 6.11 Simple south-west and north-east elevations at Rhydycar also display environmental and functional influences 1:100

The simple and rational principle of repetition and the possibility of adjoining more houses in the future made terraced housing a fast and economic option. Negative associations with repetition of form connected with workers' housing relates to 'monotony, sameness and boredom'⁹ and not meeting the desires of the individual. However reoccurring elements give continuity, reliability, stability and homogeneity. Houses repeated to form rows express a strong sense of uniformity to the street.

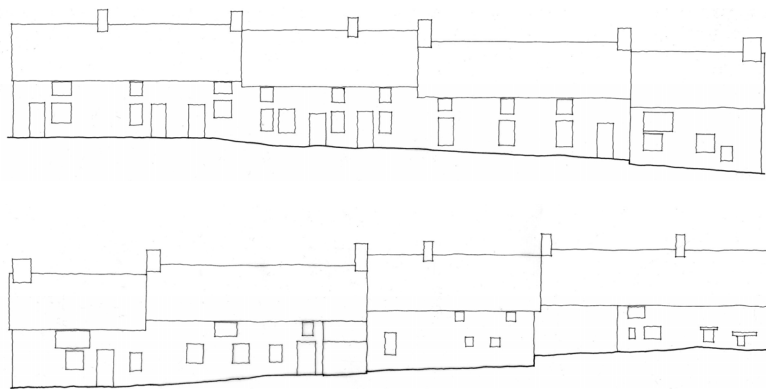


Fig. 6.12 South elevation of the terrace at Gellideg; Fig.6.13 North elevation at Gellideg showing much smaller openings



Fig. 6.14 Upper and ground floor plans of the terrace at Gellideg

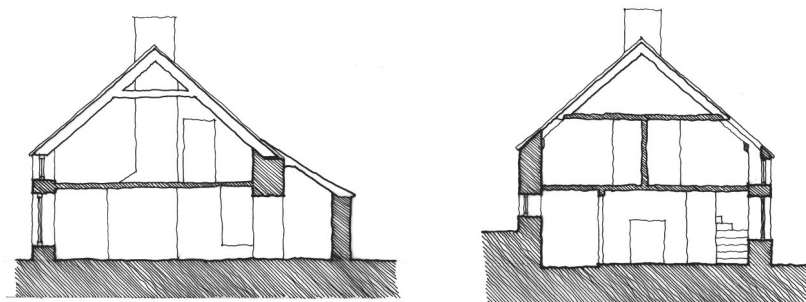


Fig. 6.15 Sections through the terrace at Gellideg 1:200

⁹ Gunter Pfeifer, *Row houses: a housing typology* (Basel: Birkhauser, 2008), p.6.

The uniform terraces were often personalised by occupiers to establish an individual identity. Front doors and window surrounds were given particular attention and sometimes painted in bright colours to give diversity to the streets and to allow residents' to give their homes their own identity and distinctiveness.



Fig. 6.16 Photograph showing different coloured window and door surrounds at the Triangle, Pentrebach, taken in 1972

Human

The dwellings were and often still are at the centre of close-knit communities where people relied on their neighbours for support. The way in which the terraces were initially planned illustrates the importance of the community working together to grow food, rear animals and share facilities such as communal baking ovens.



Fig. 6.17 Street at the Triangle, Pentrebach, taken in 1972

An indication of the way in which dwellings were inhabited is illustrated in the measured drawings of Rhydycar displayed how it would have been occupied in 1805.



Fig. 6.18 Section showing the Inhabitation of the living room at no. 17 Rhydycar 1:50

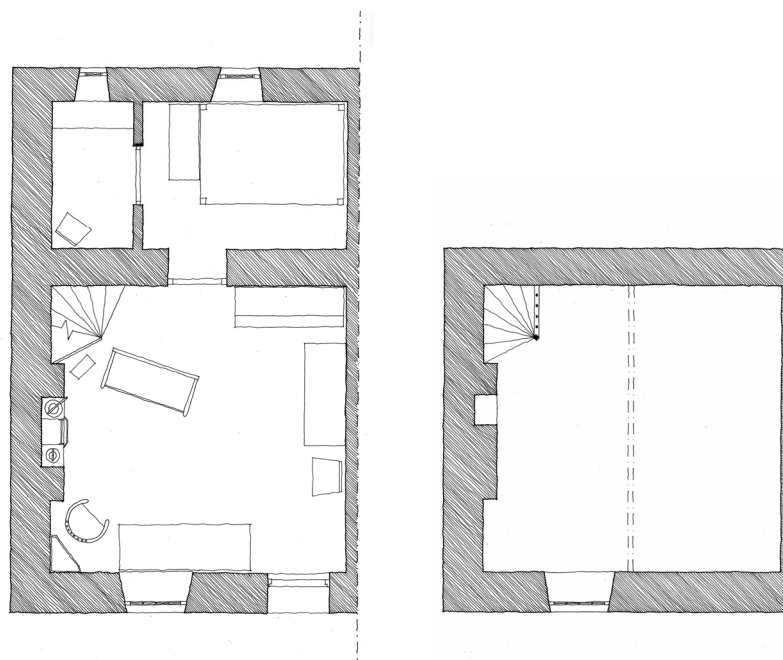


Fig. 6.19 Lower and upper floor plans showing use of space and layout of the furniture at no.17 Rhydycar 1:100

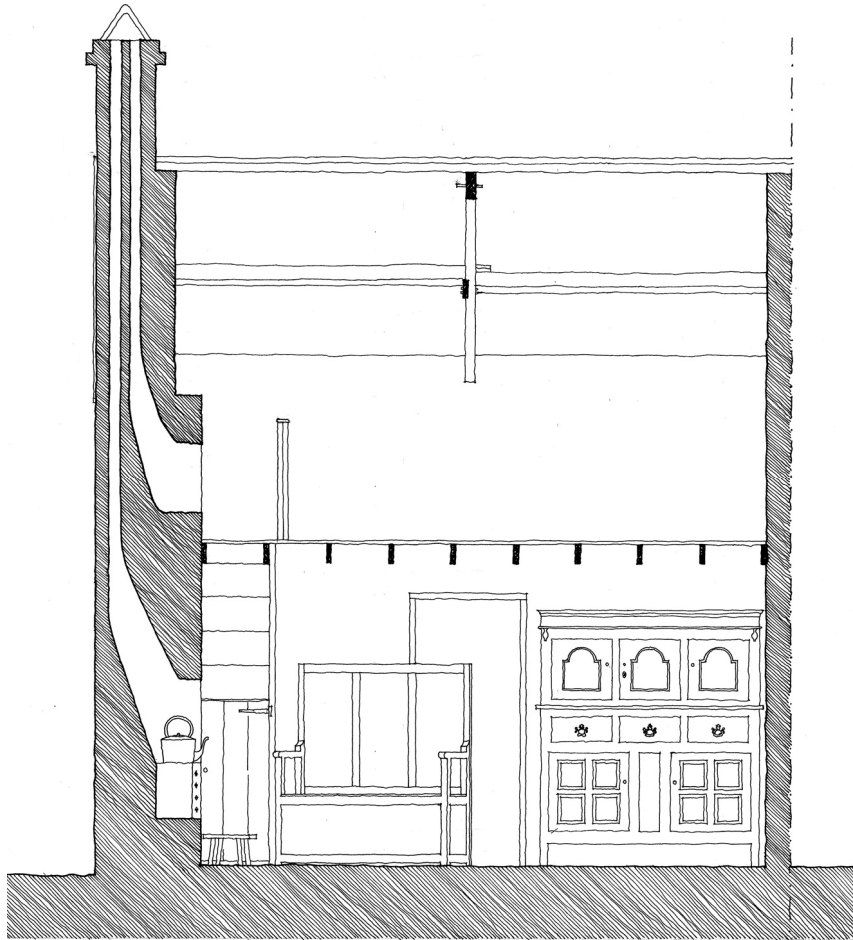


Fig. 6.20 Settle in front of the hearth and the Welsh dresser at no. 17 Rhydycar 1:50

Early houses were simply furnished comprising items similar to those found in farmhouses including a settle by the fire and a Welsh dresser. Residents displayed their personal possessions on the mantle above the fire and particular ornaments were placed in the front window. Internally bright colours were often used to paint walls and furniture and vibrantly coloured patchwork quilts and textiles were acquired, as displayed in the dwellings at Blaenavon.



Fig. 6.21 'Red rattle' colourwash, made from red ochre pigment mixed with limewash; Fig. 6.22 Blanket woven on a handloom; Fig. 6.23 Green painted pine furniture for protection and aesthetics; Fig. 6.24 Brightly coloured 'practical patchwork coverlet' made up from pieces of woven cloth

Function

The terraced houses functioned as part of the community and facilities and amenities were shared, including privies, water sources for drinking and washing and sometimes a baking oven. The primitive level of sanitation, lack of drainage provisions and refuse storage in early houses, along with large numbers of people living together, led to insanitary conditions and disease. Many of the houses also had no means of ventilation as windows weren't openable, as was the case at Rhydycar.

Few of the earliest dwellings have survived but those which have endured, such as Gellideg, have undergone extensive modifications to meet today's standards and regulations. Houses were built outwards at the backs of properties and 'living sheds' were built in the front gardens as residents added to their homes to meet their immediate spatial needs. 'Living sheds' were used as a living and working room, allowing the room in the house to be kept for best.

The diagram below of function and use of space at Rhydycar demonstrates the ways in which residents were flexible in inhabiting their plots and adapting and expanding them to fulfil their needs. It highlights how Rhydycar was flexible and capable in allowing these changes compared to the model settlement of The Ranks which permitted no modification.

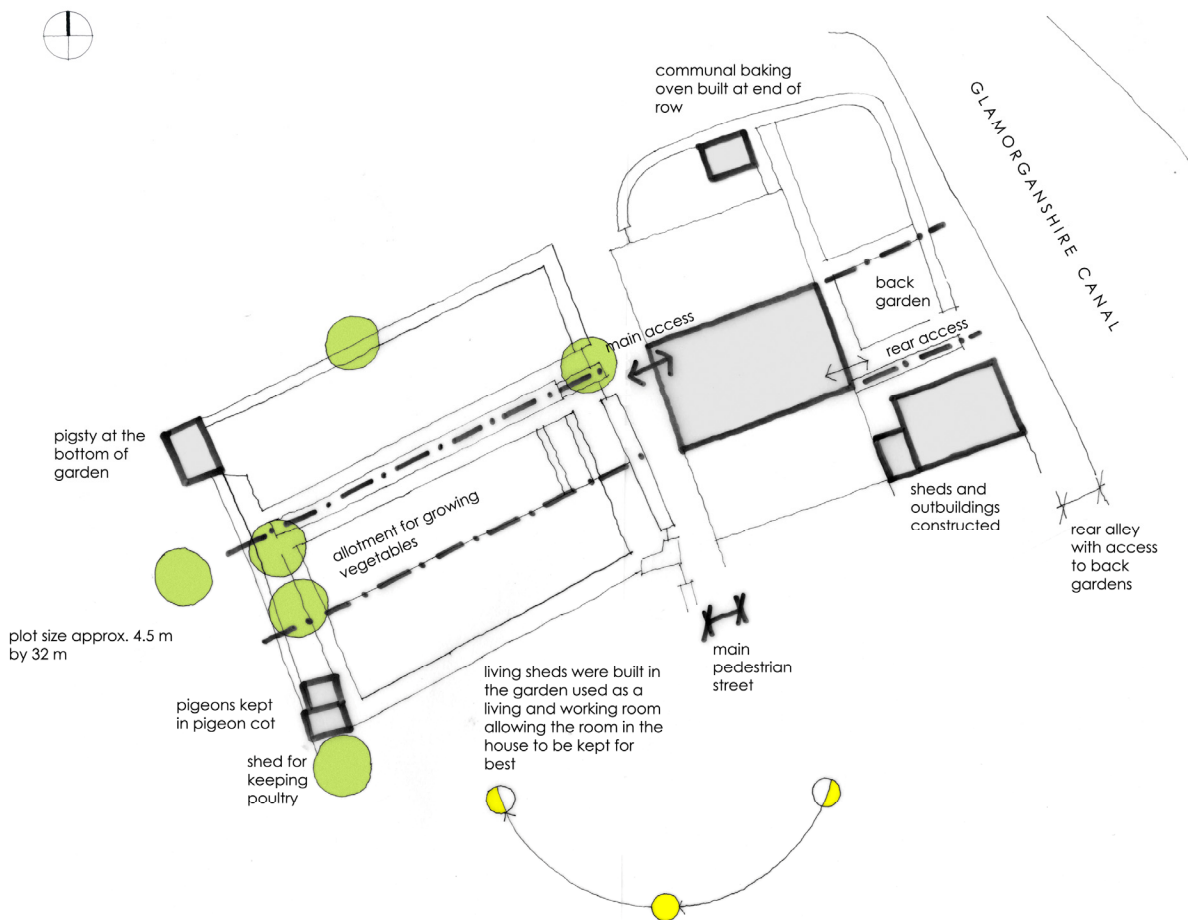


Fig. 6.25 Functional use of space at Rhydycar and flexibility in the adaptation and addition of new forms

6.2.3 Summary

Research in traditions of early industrial workers' housing confirms a number of key characteristics of the typology in its various forms and also highlights traditions specific to certain examples. Study of Rhydycar and Gellideg in particular reveal a layout with certain attributes that provides concepts applicable to housing issues today.

It is observed in the literature and contextual study that physical environmental factors of siting and climate are less influential to the design of the terrace than in the previous types studied. Location however is still critical, but dwellings are situated specifically close to the place of work on land available as opposed to a site being dictated by physical and climatic factors, as is the case in longhouses. However a number of case studies including Gellideg, Rhydycar and Nant Gwrtheyrn appear to be arranged with some consideration of orientation with the main aspect and outdoor space directed towards the south.

The construction of the early terraces draw on traditional methods carried out in farmhouses using local resources. However issues of economy begin to determine the form, along with ideas imported from further a field. This shapes the quality of materials and craftsmanship and minimal nature of the dwellings.

Form is simple and repetition is adopted in whole units and also in elements of the buildings for economical reasons. This gives a uniformity and cohesion to the street, which is broken up by residents adding identity to their dwellings by painting elements of the houses in varying bright and vibrant colours. This gives distinction to the individual dwellings and also distinctiveness of the street. It can be seen that this was first adopted in this typology as people felt the need to individualise and personalise their homes within a homogenous landscape. The use of colour is also increasingly seen to be used within the interior, on walls, furniture and in fabrics.

Significantly the terrace street appears to have been the centre of community life, made possible through the arrangement and layout of the neighbourhood. Communal living may have unintentionally been the result of economy, through the design of compact and cost-effective housing built simply to house the mass of workers. In spite of this, closely knit communities were formed as people relied on one another and facilities were shared by the community. At Rhydycar, the communal street to the front of the houses and the sociable allotment gardens provided a place for the community to engage and share their produce. It was also particularly flexible and there was space and opportunity to extend and add to the backs of the dwellings, and also in the front gardens in the form of live/work sheds. Other designs of terraces however were completely inflexible such as The Ranks, where room sizes were all identical and there was no space to modify or extend properties.

Regardless of the negative aspects and associations with the terrace, it has been illustrated that there are many positive attributes that are relevant to contemporary housing needs and

that could enhance the design of neighbourhoods in contemporary design. There is an opportunity and need to learn from the faults of the terrace and address the typology against living standards of the present, in addition to acknowledging how people have inhabited, modified and personalised their homes over time.

6.2.4 Case studies - Contemporary terraced housing

Three contemporary case studies have been selected to illustrate how current architects have re-appropriated the terrace typology in design. The precedents are selected as exemplar designs, which have been widely published. The case studies are based on the tradition of the terrace and they are chosen as they display a range of street layouts, forms and internal spatial arrangements. The case studies all include a proportion of social housing as part of the development tenure mix, which is important to the study focusing on solutions to affordable housing.

The briefs for the projects range in scale from fourteen houses in a row to a scheme involving the development of 400 homes. The locations for the designs are in various parts of England as there are no significant examples situated in Wales which are relevant to the study.

The case studies and types include:

ICON, Lime Tree Square in Street, Somerset by Feilden Clegg Bradley – Mews and raised terrace

Guest Street in New Islington, Manchester by de Metz Forbes Knight Architects, dMFK – Street and back yard

The Triangle in Swindon by Glen Howells Architects – Communal court and back yard

6.2.5 ICON, Lime Tree Square - Feilden Clegg Bradley

Lime Tree Square, completed in 2009 is part of the first phase of a development of 400 homes in Street. The initial phase of the scheme involved the construction of 138 homes including 30 social homes for rent. The client for the project is C & J Clark International Ltd (Clarks shoes), who have been based in Street since 1825. The development aims to create a sustainable exemplar family neighbourhood in a semi-urban town which addresses private and communal outdoor space and the relationship between cars, cyclists and people. The homes include a mix of deck houses, terraces, apartments and sheltered housing, arranged around open shared spaces.

6.2.6 Analysis and identification of principles

Siting

The site of the development is located within walking distance of the centre of Street, where there are numerous shops and local amenities. To the east and south of the site is existing housing and to the west is a substantial new distribution centre for Clarks. A band of undeveloped land buffers the site to the north from Westway Road that circles the town.

Surrounding local buildings are of 'local coursed blue lias stone with red pantile or slate roof and red brick chimneys. There are some examples of red and buff brickwork, rendered facades and a small amount of timber weatherboarding.'¹⁰ Traditional terraced street patterns are reinterpreted in new ways in the layout of the houses, streets and open spaces. The design relates to the landscape and setting of the site and the nature of the nearby Somerset levels.



Fig. 6.26 Arrangement of terraced rows with communal squares

¹⁰ Design Commission for Wales, *Case Studies: ICON, Lime Tree Square*
<http://dcfw.org/casestudies/view/lime_tree_square/> [accessed 15 March 2013]

Form and Arrangement

The dwellings are predominantly two storeys high, with lower one storey elements with roof terraces above and three storey elements off the larger streets. 'The relationship between internal and external space was central to the development of the deck house type, building on Feilden Clegg Bradley Studios' experience from Accordia in Cambridge.'¹¹ External space is provided on different levels. Kitchens open out onto the back gardens and outdoor spaces on the upper levels help increase the sense of space in the house and are more private. The areas of outdoor space are comparatively small but are designed to be highly useable and offer a range of spaces including sunny or shady, public or more private.¹²

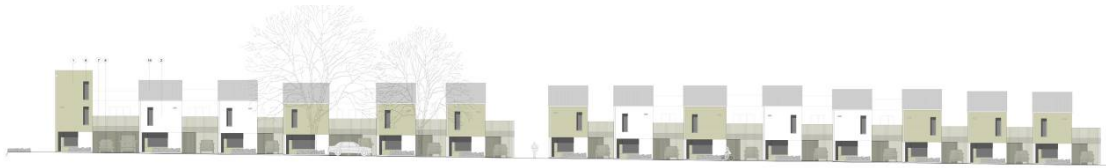


Fig. 6.27 Street elevation of 3 bed house type

The typical unit area of the two bed houses are 72 sq m and 88 to 99 sq m for the three bed houses. The four bedroom houses are on average 115 to 145 sq m.



Fig. 6.28 Ground and first floor plans of the 3 bed house type; Fig. 6.29 Spatial study of 3 bed house type

¹¹ Design Commission for Wales, *Case Studies: ICON, Lime Tree Square* <http://dcfw.org/casestudies/view/lime_tree_square/> [accessed 15 March 2013]

¹² *Ibid.*

Materials and construction

The terrace houses consist of a combination of cedar, facing brick and render with concrete roof tiles. The cedar is articulated in different ways on the façade, both vertically and horizontally and in various degrees of spacing to give variation to elevations. Local materials are used where possible, for example Blue lias was used in landscaping features. Recyclable materials were reclaimed from the demolition of the existing building on the site and crushed for reuse in the new construction.

A good level of thermal performance and airtightness is achieved through the specification of Structural Insulated Panels (SIPs) used in the build and constructed off site by Kingspan Tech. High performance timber windows and doors are used throughout.¹³



Fig. 6.30 Cedar cladding articulated to correspond with varying terrace form; Fig. 6.31 Elements are rendered; Fig.6.32 Roof terraces situated above the garages

Environmental Issues

The building envelope performance exceeds building regulations of the time by at least 25% and the envelope has a high airtightness. A number of energy options were considered including biomass CHP (Combined Heat and Power) which was 'quickly dismissed due to the lack of technology with a reliable track record at the time. A central biomass heat plant was investigated in more detail but was rejected as the costs of the infrastructure for a relatively low density scheme were not covered by the income that would be generated from supplying the very small amount of heat that would be required for each home. The high initial costs for a development that would take place in phases were a further disincentive.'¹⁴ The dwellings are designed for mechanical ventilation with heat recovery and gas condensing boilers, having been judged the most efficient and cost effective systems for the scheme. Solar hot water panels on the roof provide hot water.

¹³ Ibid.

¹⁴ Ibid.

6.2.7 Guest Street - de Metz Forbes Knight Architects, dMFK

A row of fourteen social houses for rent, designed by de Metz Forbes Knight Architects, dMFK are situated in the regeneration area of New Islington in Ancoats, Manchester and were completed in 2006. dMFK were appointed the project after winning the RIBA competition to design the fourteen dwellings. The houses were designed to a modest budget of £1.47m and in collaboration with local people who would be living in the houses. The clients for the project were Urban Splash with Great Places Housing Group, English Partnerships and North East Manchester Regeneration. The housing mix includes 6 x 3 bed (two storey) houses, 6 x 2 bed (two storey) houses and 2 x 2 bed (one storey) houses

6.2.8 Analysis and identification of principles

Siting

The houses are sited on a 1600 sqm plot of land, which is part of a larger 29 acre New Islington regeneration scheme of the area that was industrial wasteland between the old Aston and Oldham-Rochdale canals. The net density is around 70dph. It is also proposed that as 'part of the broader landscape strategy, the new and existing housing will eventually share a wide communal garden immediately behind the individual back gardens, with the provision for in-curtilage parking...Opposite the house fronts and their new street will be a public space bounded by a new canal-side block of private housing, another finger in the masterplan.'¹⁵ The houses follow the landscape of the site and are slightly staggered reflecting the gently sloping topography.

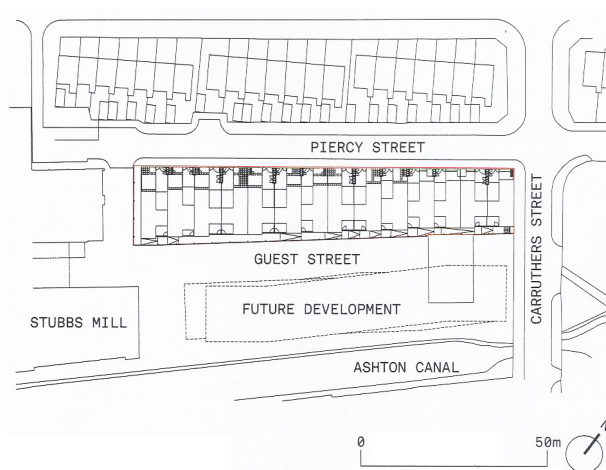


Fig. 6.33 Terrace arrangement with south east facing front facades

¹⁵ Eamonn Canniffe and Sally Stone, 'dMFK/ New Islington', *Architects Journal*, 225.18 (2007), 25-39 (p.28).

Form and Arrangement

The terrace of dwellings run parallel to the existing Cardroom Estate and is articulated along the street with elements of the houses set back to form private courtyards off the building line. This allows for windows on three sides of the individual house forms to give additional light to dwellings and to improve ventilation. A large square window on the front elevation maximises light into the houses. The dividing courtyards and stepped plan give visual separation to each house and an impression of successive brick blocks of differing heights and sizes. Canniffe and Stone state that the row of houses can't really be 'described as a true terrace, as at both the front and rear the elevations are fractured, and interspersed with courtyards and gardens'.¹⁶ The flat roofs of the terrace are a contrast to the saw-tooth roofs of a nearby mill building.



Fig. 6.34 Flat roofs contrast with the pitched roofs of the nearby mill building, whereas materials specified are similar in appearance

There are variations in dwelling types in terms of the amount of accommodation and the form of its arrangement. The dwellings are thoroughly considered to provide for the requirements and desires of the prospective residents. There are single storey two bedroom dwellings, as well as two storey two and three bedroom dwellings, which give diversity to the form of the row. Courtyards at the fronts of the dwellings provide a semi private space and a defensible space in front of openings off the main street. The gardens to the backs are more private and allow for secure parking on the property. Three bedroom family houses are sited towards the Mill building, where the gardens are larger.



Fig. 6.35 Street elevation, the varied, yet unified form follows the sloping site

¹⁶ Ibid., p.28.



Fig. 6.36 T-shaped house plans arranged in different ways to form the street

The houses have a T-shaped plan with a spacious kitchen at the heart of the plan, which opens onto the dining and living areas. Open plan living on the ground floor maximises the space available within the dwellings and circulation space is minimal. The spaces are flexible and screens add privacy and divide places. The two bed houses of one storey have a different living area arrangement from those of two storeys. There is an opportunity to access a roof terrace above the kitchen in the two bed two storey homes.

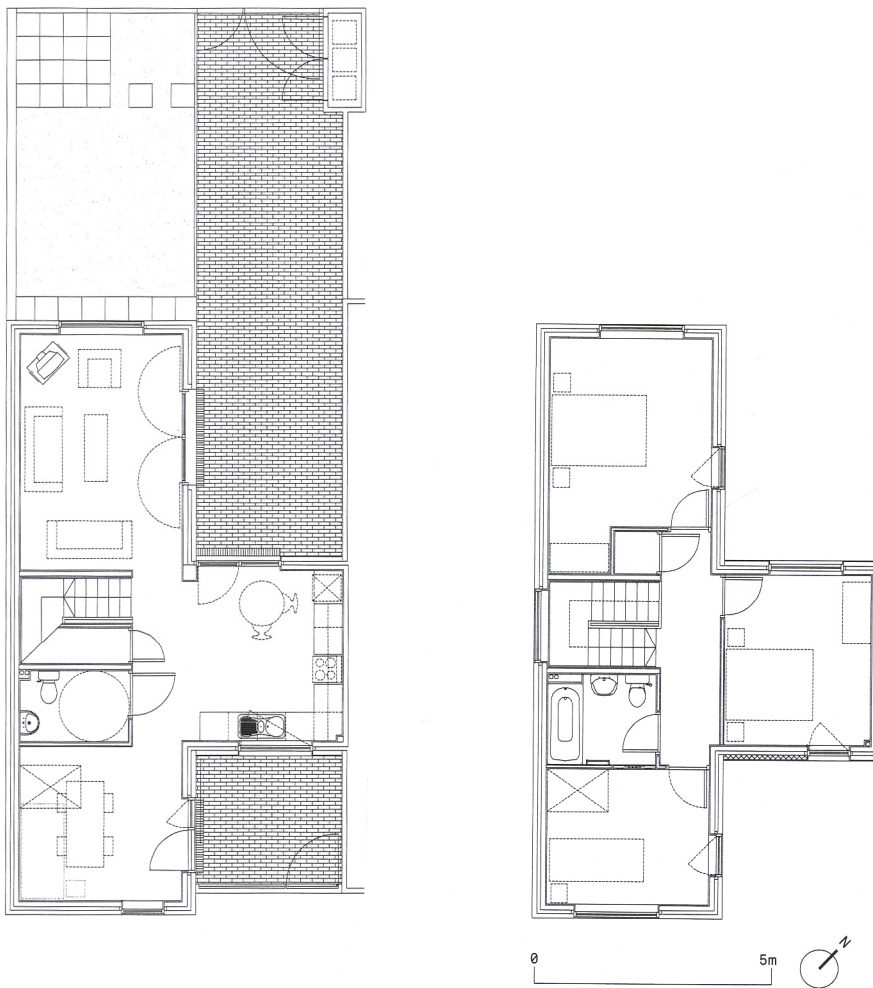


Fig. 6.37 Ground and first floor plans of the 3 bed house type

Materials and construction

Conventional building materials are used for the housing scheme. The building envelope consists of internal load bearing blockwork with cavity and brick outer leaf. The brick and block walls are partly filled with 50mm polyurethane insulation. The ground floors are constructed of pre-cast-beam-and-block units and the flat roofs are simple timber joists with a plywood skin. The roofs take a sedum covering creating green roofs.¹⁷

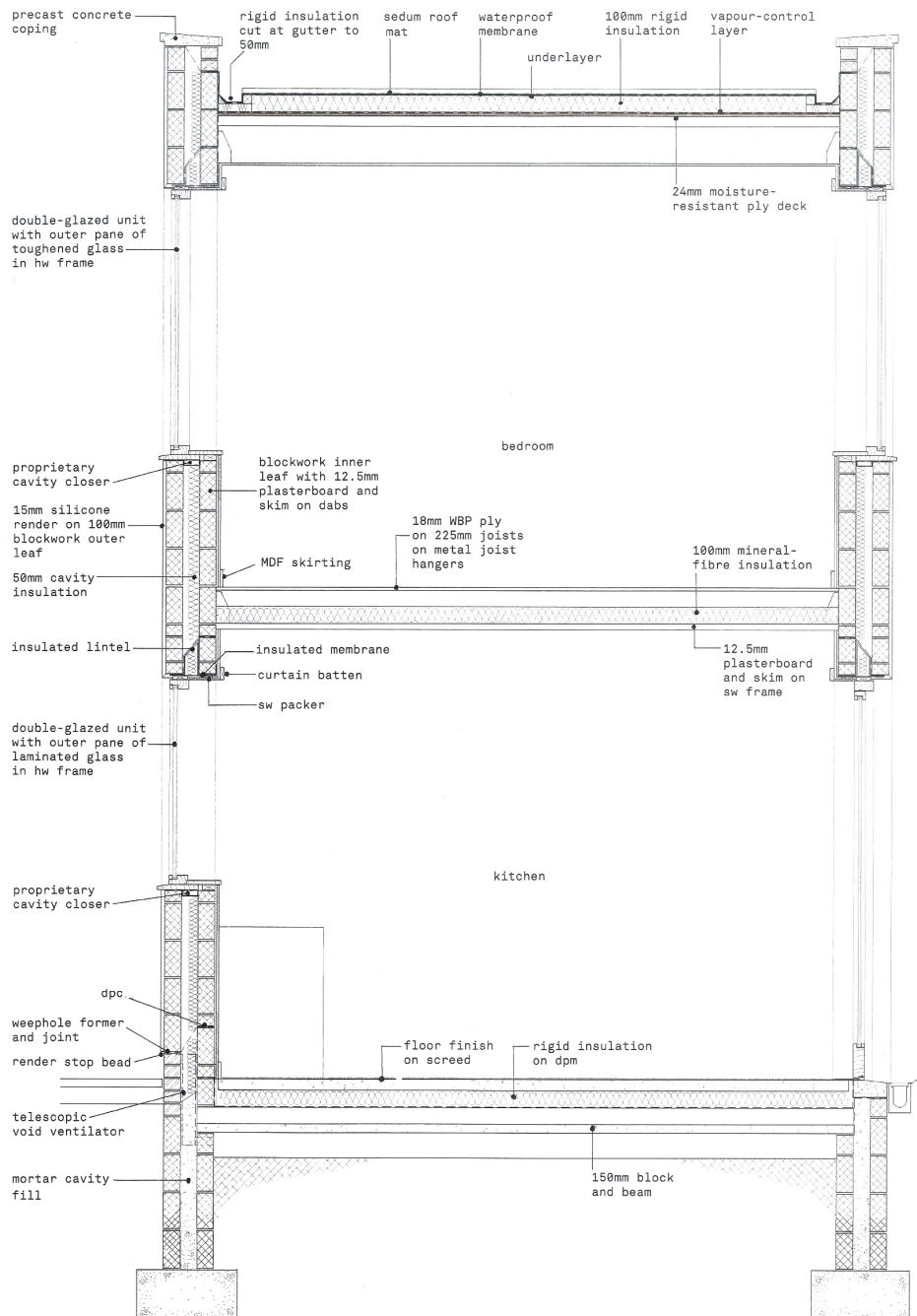


Fig. 6.38 Conventional building construction with simple detailing

¹⁷ Canniffe and Stone, p.32.

The individual houses are constructed out of a palette of four local brick types of varying colour and texture, with linking blocks and off white render. The architects specified 'sharp, robust detailing, rugged contrasting brick types to echo the context'¹⁸ of the surrounding old brick industrial mill buildings. The building materials chosen were selected as materials that have a surface quality that weathers well with time.

Window frames use a range of three different shades of grey for each house. There is simplicity in the detailing, the large window is fixed so there is a minimal painted frame and one substantial piece of glass, there is no header course and only the smallest sill.¹⁹

De Metz admits intelligent architecture adds to the price, 'it does cost a bit more. It costs more in design time... They're as well crafted as we've been able to manage on a budget. We could have got the price down – these cost £100,000 each – if we'd been able to build 114 rather than just 14.'²⁰

Environmental Issues

The scheme is sustainable as it has been designed specifically for the needs of the users and in the wider context of the community. This was achieved by the architects spending much time discussing what the future residents wanted from their new homes. Julian de Metz of dMFK Architects describes:

We found people wanted very specific, fundamentally simple things that don't determine the way houses look but do determine the way they're planned. They asked for two-storey houses with lots of daylight and a big kitchen. The old terraced houses in Ancoats, where most of them lived before, had pinched kitchens jutting out at the back. What people wanted was a kitchen at the centre of the houses, a room in which everyone could gather naturally, and eat around a table. Or where children could do their homework. Knowing that residents wanted such things enabled us to plan the new houses ways that mattered to them, yet we were still able to shape a form and style of architecture we were happy with.²¹

The houses provide high levels of natural light and flexible spaces for occupants varied needs. Canniffe and Stone describe:

The self-effacement and modesty represented by Guest Street suggests a sustainable model, both in terms of the material quality of the building and the urbane common sense of its simple form. Through the architect's sensitive use of typology, variation and difference, the traditional strength of the terrace and the contextualism it implies are employed for the most important purpose – allowing residents to create the public face of their homes rather than imposing an image.²²

The project was awarded Eco Homes 'excellent' rating incorporating CHP units. Three lifetime home standard types were also created.

¹⁸ DKMF, *New Islington* <<http://www.dmfk.co.uk/media/uploads/2010/02/1870/new-islington-pdf.pdf>> [accessed 13 March 2013]

¹⁹ *Ibid.*, p.29.

²⁰ Jonathan Glancy, 'Is this what you mean, Gordon?', *The Guardian*, 17 July 2007 <<http://www.guardian.co.uk/artanddesign/2007/jul/17/architecture.communities>> [accessed 13 March 2013]

²¹ *Ibid.*

²² Canniffe and Stone, p.29.

6.2.9 The Triangle - Glen Howells Architects

The scheme of 42 dwellings including 16 two bed, 13 three bed and 7 four bed houses, along with 4 one bed and 2 two bed apartments, off Northern Road in Swindon was developed by the company Hab Oakus, headed by Kevin McCloud and designed by Glen Howells Architects. It was completed towards the end of 2011. The houses are designed for a mix of Intermediate Rent, Rent to Homebuy and homes affordable for rent to local residents of Swindon. The project principles and objectives are for 'a sense of community, a belief in the importance of public space, a commitment to sustainable lifestyles and outstanding contextual design.'²³ The primary aim is to create 'excellent, ordinary housing on an ordinary budget,' through the detailing and specification of elements as well as a connection to the wider landscape and community of Swindon.²⁴

6.2.10 Analysis and identification of principles

Siting

The site is within cycling and walking distance from Swindon centre. It is quite a compact site surrounded by two storey inter-war brick and render houses. The houses are arranged in traditional terraces to create an enclosed communal space. The scheme is focused around this 'village green', which aims to bring the community together 'giving The Triangle a strong sense of place and acting as a focus for interaction and play.'²⁵



Fig. 6.39 Site plan of house types arranged around a triangular green

²³ Design Commission for Wales, *Case Studies: The Triangle* <http://dcfw.org/casestudies/view/the_triangle_swindon/> [accessed 15 March 2013]

²⁴ Ibid.

²⁵ Ibid.

Form and Arrangement

The houses are a contemporary interpretation of the English terraced house and particularly the mid Victorian railway cottages of Swindon. The entrances, chimney form and windows were used to give the simple, long rows of houses vertical emphasis. The elevations are painted various tones of cream and grey to reflect the existing terraces and semi-detached houses in the area. The front gardens of the houses are separated by espalier fruit trees and gabion walls.

The form and arrangement of the dwellings are nothing out of the ordinary, but small elements of design have been considered, which are often dismissed. These include larger windows and higher ceilings on the ground floor than in the majority of new housing and there is also space for bike storage in the porch.

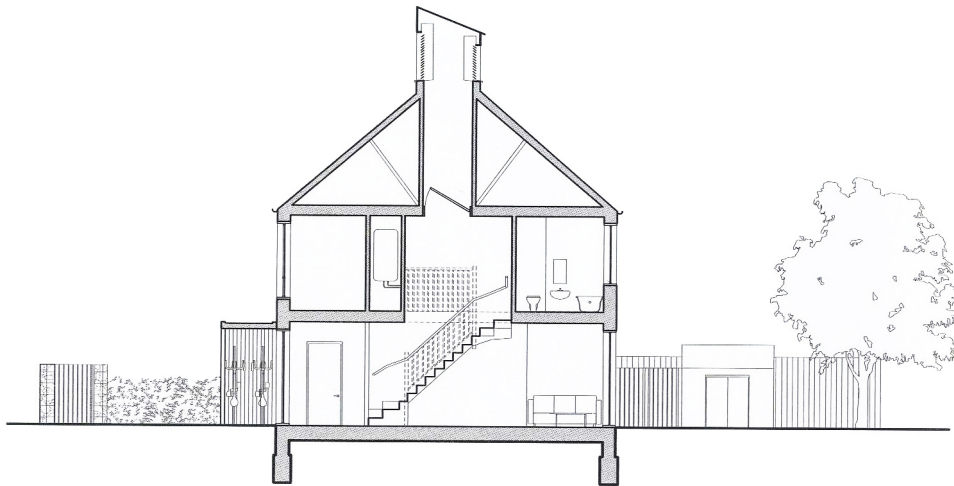


Fig. 6.40 Section through 2 bed house type



Fig. 6.41 First and ground floor plans of 2 bed house type



Fig. 6.42 Repetition form with variation in the coloured render

Materials and construction

The homes are designed to a restricted budget and are affordable to build. They are economical to manage in the long run. A simple palette of materials are used in the construction. The primary building materials for the scheme utilise sustainable resources including timber and hemp and sheep's wool insulation is used to insulate the loft. The external walls are constructed from Hemcrete cast in situ around a timber frame. The hemcrete was 'specified with consideration to the embodied energy, recyclable content and maintenance requirements while offering high performance levels.'²⁶ Hemp, a natural product grown in the UK, is mixed with a lime binder. Hemcrete provides high insulation and airtightness as well as properties of thermal mass reducing temperature fluctuations. It is carbon negative and extracts more carbon from the atmosphere than it puts in. The Hemcrete is finished with lime render internally and externally. Stock clay tiles in three different finishes are used to tile the roof and gabion walls enclose the bin stores. Other finishes include galvanised steel and timber.



Fig. 6.43 Communal green as a focus to the scheme

²⁶ Ibid.

Environmental Issues

Environmentally the scheme attempts to address issues relating to the wider community and encourage community involvement and participation. It encourages the use of the bicycle over the car, offering only one car parking space per dwelling and bike storage outside the front of the house. A Car Club has been established as part of the scheme. Allotments provide 'kitchen gardens' for residents and encourage community interaction.

The houses consist of a high performance envelope and are highly insulated with 350mm of Hemcrete. Materials are obtained from sustainable sources where possible. Internally finishes are durable to reduce whole life costs. Energy efficient and water saving appliances are specified.

Passive design strategies are implemented over mechanical systems. Natural daylight is maximised to reduce the need for artificial light, but the amount of glazing is determined to give the optimum solar gain in winter without overheating in the summer. The houses are naturally ventilated by 'the stack effect' and warm air is drawn out through the thermal chimney.

6.2.11 Summary

The three case studies recognise that principles from tradition of the terrace are still appropriate today and show how they can be combined with modern ways of living and new technologies in diverse ways. They demonstrate how negative aspects connected to the terrace are readdressed to enhance design, including issues of a lack of natural light and ventilation. Arrangement and orientation of houses in the schemes are considered, along with passive design strategies, not always acknowledged in traditional examples of the terrace. Terrace layouts and the relationship between individual dwellings and the street are designed to encourage community engagement with neighbours through public spaces and semi-private allotment gardens. This is particularly evident at the Triangle.

The form of the dwellings in the three projects adopt a concept of repetition of form and building elements, but also show a degree of variation through articulation of form, differences in materials and finishes and in shades of colour. Unlike the initial terrace tradition of units maintaining little variation apart from the adaptations made by residents and the application of colour, the case study examples demonstrate variations in the size of dwellings to suit different occupants' spatial needs. The house types show variations in both form and the elevations, but the projects retain a uniformity and consistency. The internal layouts of the workers' housing were determined by a combination of economy, form and construction, without much consideration for occupants' needs. The schemes analysed here differ, displaying a much greater level of design of space with regard to occupants' requirements, this is particularly apparent at Guest Street.

The recent case study examples highlight how there are a number of suitable options of construction for terraced housing. One project uses SIPs construction system, another uses a more conventional brick and block construction and another a timber frame with cast in-situ concrete. In addition to the diverse range of construction techniques available, the schemes display a range of material finishes including cedar, brick and render, applied in multiple ways.

The three case studies therefore adopt elements of tradition and progress concepts appropriate for housing needs today. The case studies are useful as they give more direct and comparable reinterpretations of tradition than the previous live work contemporary case studies. They also relate more closely to the objectives proposed for the design of contemporary affordable terraced housing. The lessons learnt from all the projects will be instrumental in establishing a set of principles for the model, to inform the subsequent design study. In the research, Guest Street and The Triangle appear most influential to the study alongside the traditional examples of Rhydycar and Gellideg.

6.3 Principles

Following studies of traditional early industrial workers' housing and contemporary reinterpretations of the terrace typology, principles from the design of the row type are identified to employ in the design study. These principles are established by analysing the most fundamental influences to terraced housing.

6.3.1 Model for design

The degree of significance of principles relating to the terrace is defined and illustrated in the hierarchy of needs diagram below, based on Maslow's hierarchy and using the principles determined in the operational framework in the methodology. The most fundamental needs are placed at the base and less significant factors towards the top. These are then related back to the operational framework through colour coding to determine the key influences that shaped the typology.

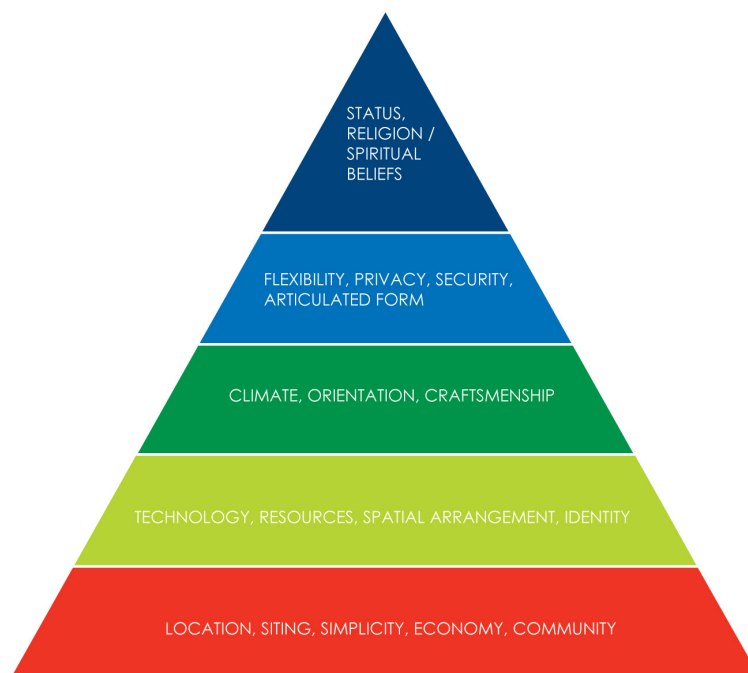


Fig. 6.44 Hierarchy of needs with the most significant needs at the base of the triangle

PHYSICAL	CONSTRUCTION	FORM	HUMAN	FUNCTION
LOCATION	RESOURCES	SIMPLICITY	COMMUNITY	ECONOMY
SITING	TECHNOLOGY	IDENTITY	PRIVACY	SPATIAL ARRANGEMENT
CLIMATE	CRAFTSMANSHIP	ARTICULATED	RELIGIOUS/ SPIRITUAL BELIEFS	FLEXIBILITY
ORIENTATION			STATUS	SECURITY

Fig. 6.45 Chart of influences affecting the terrace house typology relating to the hierarchy of needs diagram

6.3.2 Design approach

From the hierarchy of needs based on the working framework of principles, the most significant factors affecting the design of the traditional and contemporary terraced housing are drawn up to inform the subsequent design study. These are listed below:

6.3.3 Principles

- Landscape and site
- Community and place
- Repetition and identity
- Economy and flexibility
- Simplicity

6.4 Design

6.4.1 Introduction

The terraced houses are designed for key workers in Pentrebach, Merthyr Tydfil. The dwellings are to be of a simple form and construction, to be economical (involving repetition of elements) and to comply with standards and regulations. It is also critical that there is an aspect of community engagement within the design and also an opportunity for the residents to individualise their homes and give them identity. These principles were formed from the hierarchy of needs produced from the early industrial workers' houses. The direction of how these principles would inform the design was left open, with the principles used as an aid to influence the design throughout the process.

6.4.2 Brief

The brief is for a development of houses arranged in terraces for a site identified in Pentrebach, Merthyr Tydfil. Initial feasibility studies will determine a suitable number of houses for the site and appropriate housing mix, with the aid of findings drawn from traditional and contemporary case studies. The brief will comprise a communal pedestrian street with courtyard to the fronts of dwellings with parking sited away from dwellings. There will be provision for allotment gardens and various levels of private outdoor spaces. The brief will incorporate principles distinguished in the design approach and will be developed through studies as the design is carried out.

6.4.3 Site



Fig. 6.46 Location of the site in the valleys of south Wales

The site for the proposed design of a terrace of houses is in Pentrebach, meaning little village, located in the County Borough of Merthyr Tydfil, Wales. The village is to the eastern side of the River Taff, south of Merthyr Tydfil. The original core of the village was founded in 1763 from a small road-side settlement, comprising five buildings and a tollbooth, at the time the Plymouth Ironworks were built. The South Duffryn Colliery opened in 1862 to the south side of the village. It had two 250m shafts and at the height of production 1300 men worked there. An open cast mine was also located on the mountainside above the village.

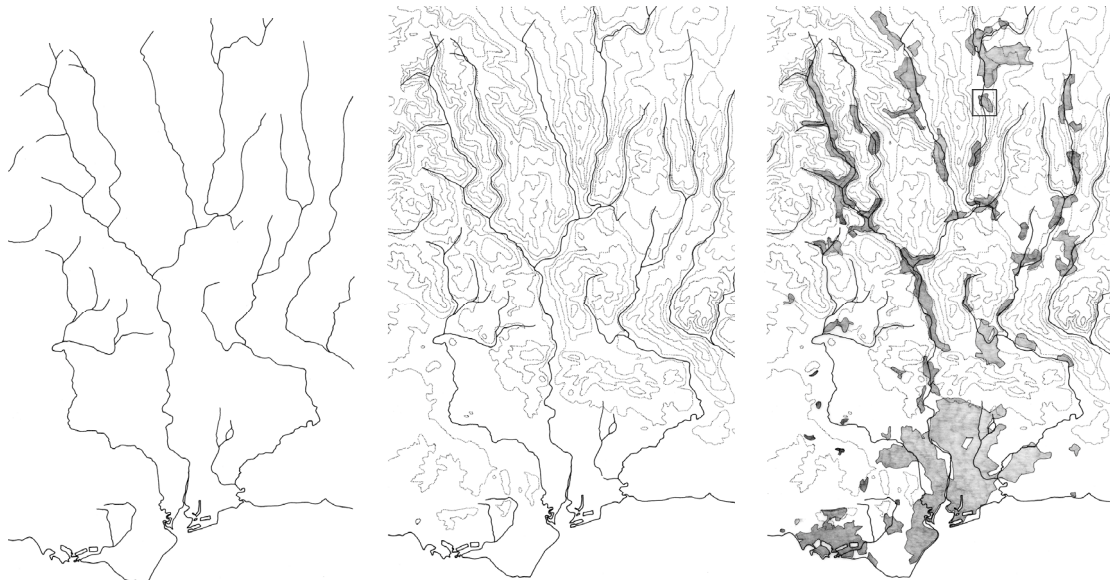


Fig. 6.47 Rivers; Fig. 6.48 Rivers and contours; Fig. 6.49 Rivers, contours and settlement in the Valleys

Taibach is located further south at the heart of the surviving settlement of Pentrebach, initially formed as a small, nucleated settlement adjacent to the Plymouth feeder. Taibach comprised an L-shaped arrangement of row houses located west of the road to the Pentrebach Iron

Works and additional terraced rows (the present Taibach) to the south of the Plymouth Feeder canal, constructed around 1840, with allotments to the fronts. By the mid-19th century Taibach formed part of the estate of the Plymouth Iron Works.



Fig. 6.50 Historic map of Taibach in 1870; Fig. 6.51 Sketch of industrial terrace at Taibach; Fig. 6.52 Impression of landscape beyond the site

Between 1898 and 1915 Taibach underwent a major expansion; probably connected to the continued working of the area's coal reserves at the South Dyffryn Pit, the nearby Bwlfa Levels, and in particular, the North Dyffryn Pit, which was operational until the Second World War. The Plymouth Ironworks closed in 1882 and the South Duffryn Colliery ceased production in 1940. The area retains examples of pre-1850 housing, though it is now characterised by industrial houses of the late 19th and early 20th century. The old industrial workers housing still standing at Taibach was renovated by Merthyr Tydfil Housing Association and opened in 1989. The allotments were made into a private courtyard for residents of the houses and small back gardens retained. Late 20th century council estates also now dominate the urban character of the area and the settlement has a recreation ground, public house, Baptist Chapel, Infant School and Post Office.



Fig. 6.53 Pentrebach facing west

6.4.4 Design approach and principles

- **Landscape and siting**

The location for the design is on the site of Pentrebach Labour Club, Central Fish Shop and a large car park. To the north of the site are early 20th century terrace houses and to the south, Taibach 1840s industrial workers housing. To the west there is a large playing field with a hall opposite the site, which appears to be disused. To the east of the site is a steep embankment with a path running up to the late 20th century social housing above.



Fig. 6.54 Existing site in Pentrebach 1:2500



Fig. 6.55 Sketch section through site facing north 1:2000



Fig. 6.56 Sketch elevation facing south along Hickman Street 1:1000



Fig. 6.57 Sketch elevation facing west 1:1000

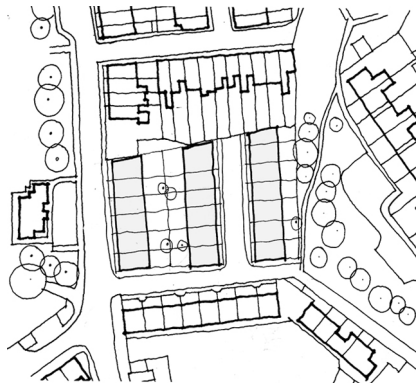
Initially the site was analysed and a number of sketch schemes were produced to come up with some alternatives of how the dwellings could be placed on the site. A number of options were looked at drawing on the layout of industrial workers housing. These included back to back houses, terraces with different orientations and garden sizes and houses with allotments. The site is much larger and does not have as many constraints as the Pontcanna, resulting in a number of layout options. As the site is not in a conservation area there were fewer restrictions on the design.



24 houses
Back to back with roof terraces
E/W orientation



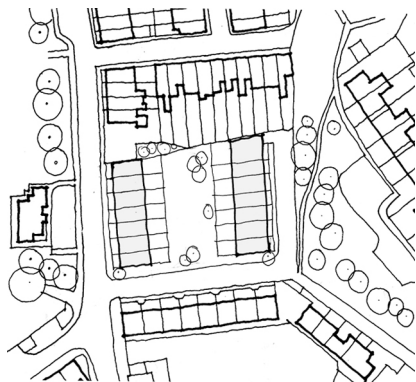
12 houses
Small back yard and communal garden
L-shaped with E/W and N/S orientation



19 houses
Small back gardens
E/W orientation



12 houses
Large back gardens and communal
buffer space, long plots with N/S
orientation



14 houses
Small back gardens and communal
garden
E/W orientation



11 houses
Small back gardens and large front
garden allotments, long plots with N/E
orientation with parking at the rear

Fig. 6.58 Sketch scheme feasibility studies 1:2500

The chosen site layout draws on the layout of early traditional Industrial Workers housing such as Taibach, Rhydycar and Gellideg in particular. Central to the design is the communal pedestrian street that attempts to retain a closely-knit neighbourhood that was once common in the Valley terraced streets. To one side of this public street are allotment gardens for the residents, which are quite open and allow for interaction of the community. Opposite the allotments and across the street are the front entrances to the dwellings. The thresholds to the houses offer a connection to the public street, through places created to sit out and chat with neighbours, while a low planted front offers privacy to the dwelling. More secluded back gardens and roof terraces allow the residents to retreat to their own private space. The various gardens at different levels provide different degrees of privacy and engagement with the community. The layout differs to traditional siting as the allotments and communal street in this design are to the north of the site allowing for the south facing façade to be more private with secluded back gardens and roof terraces. Concerns that the residents will use their back entrance more than the front (as this is where the car is parked) are overcome with the positioning of allotment gardens at the fronts.



Fig. 6.59 Site plan of proposed scheme 1:2000

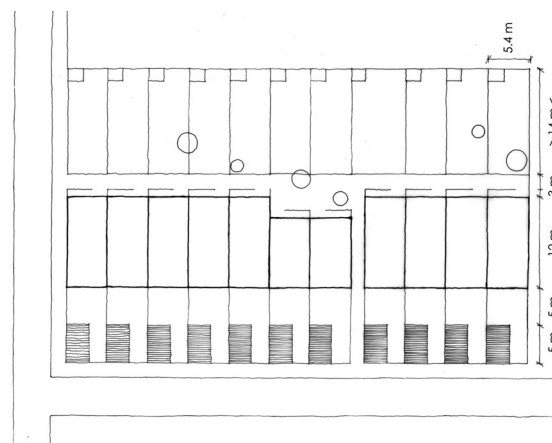


Fig. 6.60 General site layout, which could be adopted and adapted to suit other sites 1:100

The layout of 11 units has an entry from the north, southern aspect to the private garden at the rear and is of a housing mix of 2 x 2B4P and 9 x 3B5P or 4B6P house, depending on occupants' needs and with the option of later extension from 2 to 3 to 4 bed.

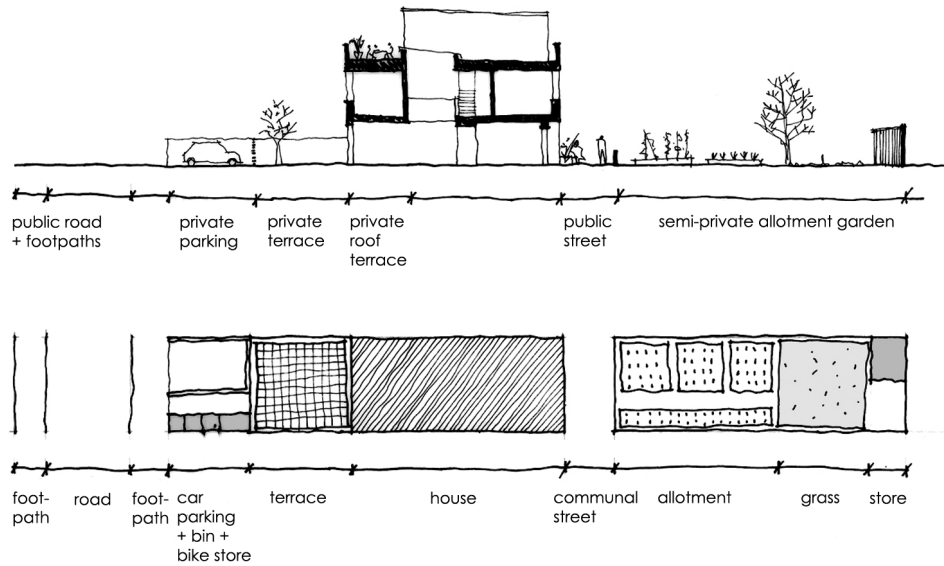


Fig. 6.61 Concept diagram in relation to public and private spaces

▪ **Community and place**

The central pedestrian street is at the heart of the community where house fronts and allotments are accessed. A small courtyard in front of the 2 bed houses provides a place for residents to gather and it breaks the relentless repetition of the street, whilst retaining uniformity. Each dwelling has a sheltered seat in the recessed porch. A low wall that can also be used as a seat acts as a threshold to each property off the street. Behind the wall there is space to grow plants to provide privacy to ground floor rooms adjacent to the communal street. The front entrances are to the north so that the private gardens to the south rear receive sunlight for the greater part of the day.

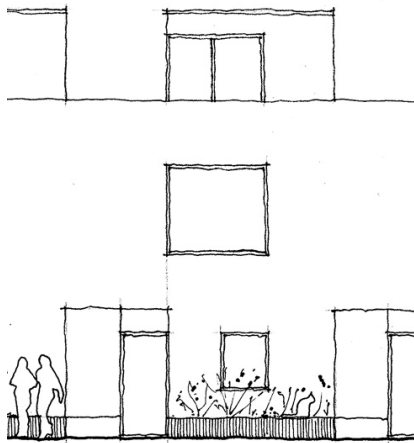


Fig. 6.62 Front street elevation 1:100

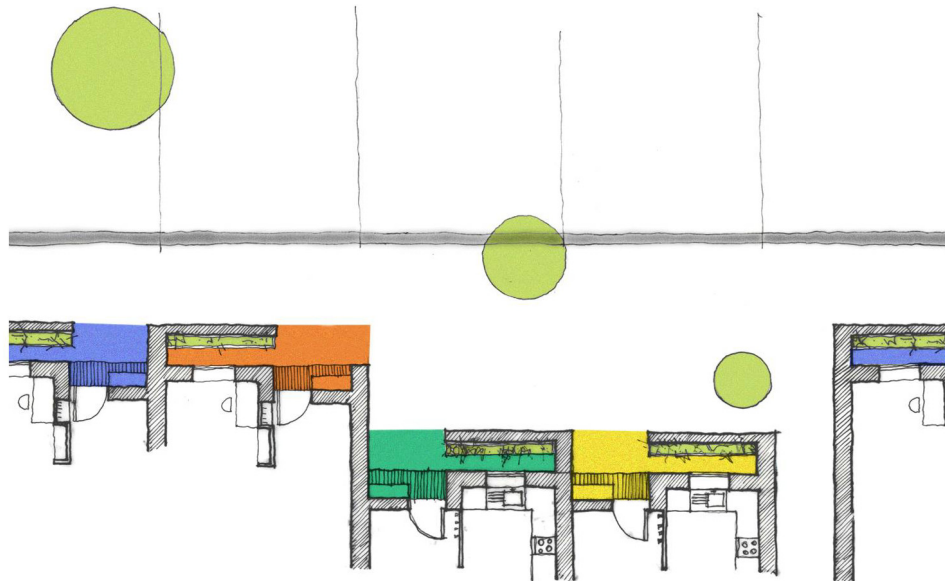


Fig. 6.63 Colour, identity and place

- **Repetition and identity**

Despite the simplicity of the design, some interesting places have been created. The elevations are very simple with openings pierced into the façade. The different dwelling types use the same window sizes and proportions. The 2 bed dwellings are handed to break up the endless repetition and they are set back to create a small courtyard. This is successful as it provides the street with a continuous repetitive element which is broken up in places to add interest but retains the characteristic nature of the terrace.

The dwellings are distinguished by different coloured porch reveals. Bright traditional colours including terracotta, yellow ochre, green and blue will be used. The porches and low threshold walls provide the opportunity for residents to show off their own individual elements to their property.

- **Economy and flexibility**

The house type layouts are mostly simple. The 3 and 4 bedroom plans have a roof light that gives light to the dining area. It also makes the landing area more spacious, creating an area to store books. This has resulted in the stair continuing up across the landing in the three storey houses. This is not the most efficient circulation space but has allowed for more interesting spaces and more efficient use of space elsewhere. The floor areas of each house type layout adhere to London Design Guide space standards. The layouts are spacious but are not wasteful of space. The design is economical with regards to materials and construction that will be used. Some aspects will be more costly such as the double height dining space with roof light above and the third storey pods on the top.

The houses can be altered and added to in the future as families outgrow their space. It draws on the traditional terrace approach to constructing 'add ons' to the backs of properties, but in a more systematic way. The method of construction intended for the design is a timber frame, with highly insulated walls and a render system which would allow for adaptation in the future. The third storey would be made of prefabricated module.

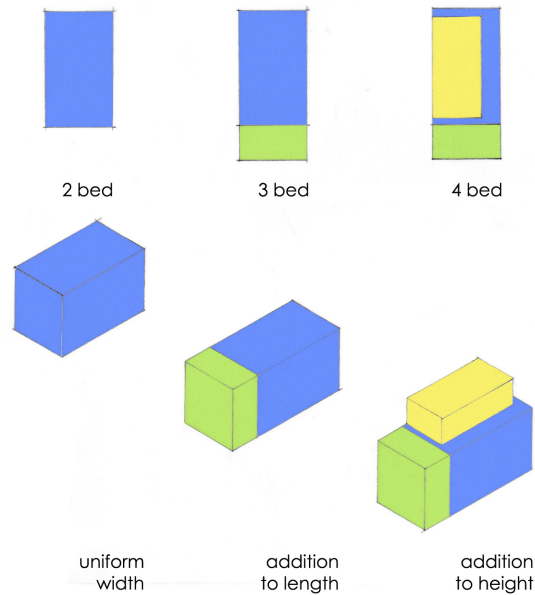


Fig. 6.64 House types allow for expansion in the future

▪ **Simplicity**

The project attempts to design with simplicity of form and construction. The facades are simple with flat roofs and minimally detailed openings. Fewer, but larger window openings are designed for each dwelling to create elevations of a simple composition.



Fig. 6.65 Simple composition and form of north and south elevations 1:500

A closed panel timber frame structure is specified for construction with an exterior insulation and finish system (EIFS). This method of construction is adopted as it consists simply of only two primary elements – a structural frame and an EIFS. The system fulfils thermal requirements, waterproofing and provides an aesthetic finish in one system.

6.4.5 Final drawings



Fig. 6.66 Site plan 1:2500

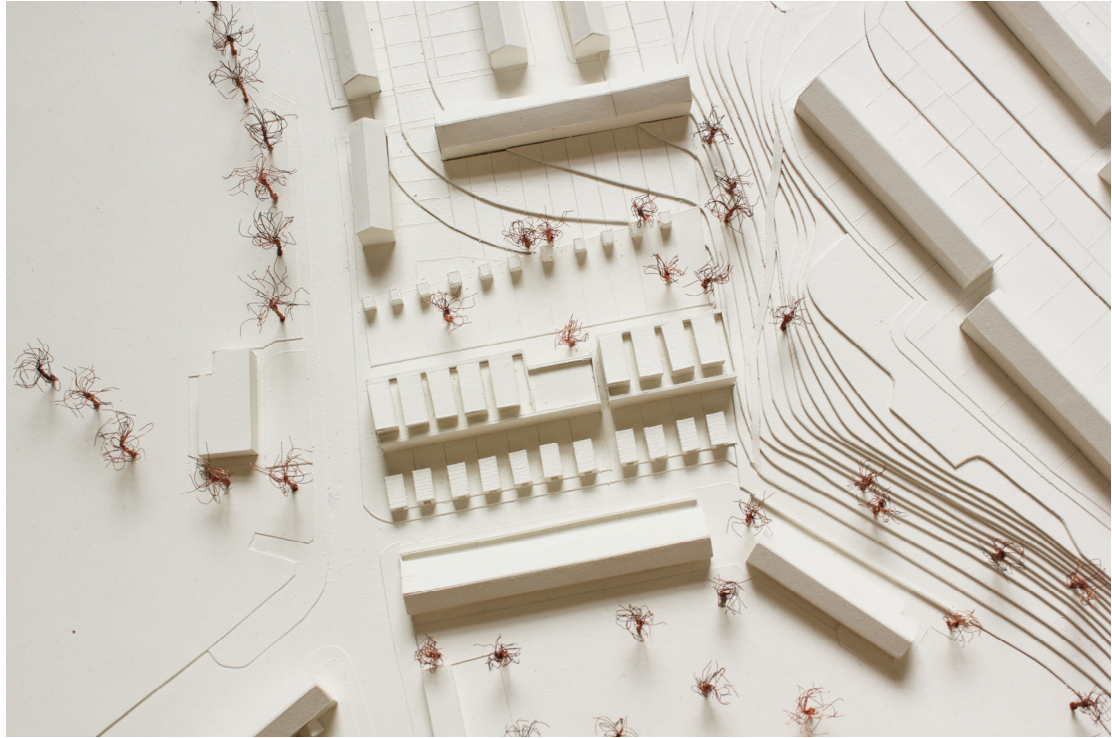
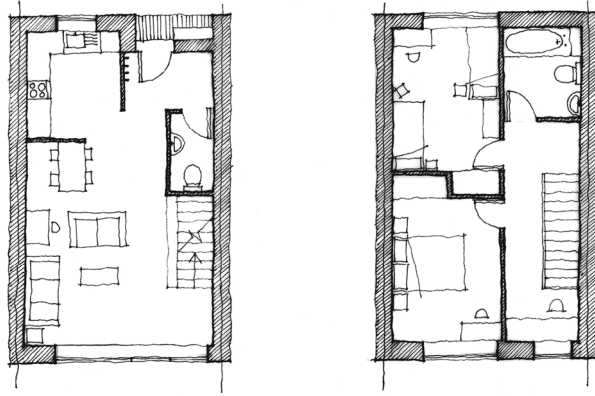
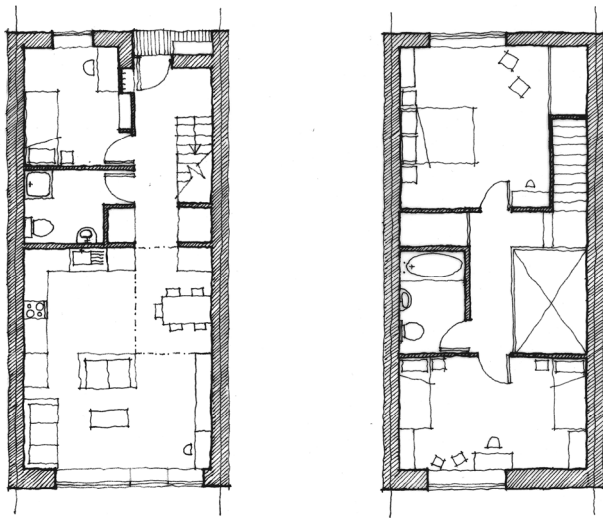


Fig. 6.67 Site model



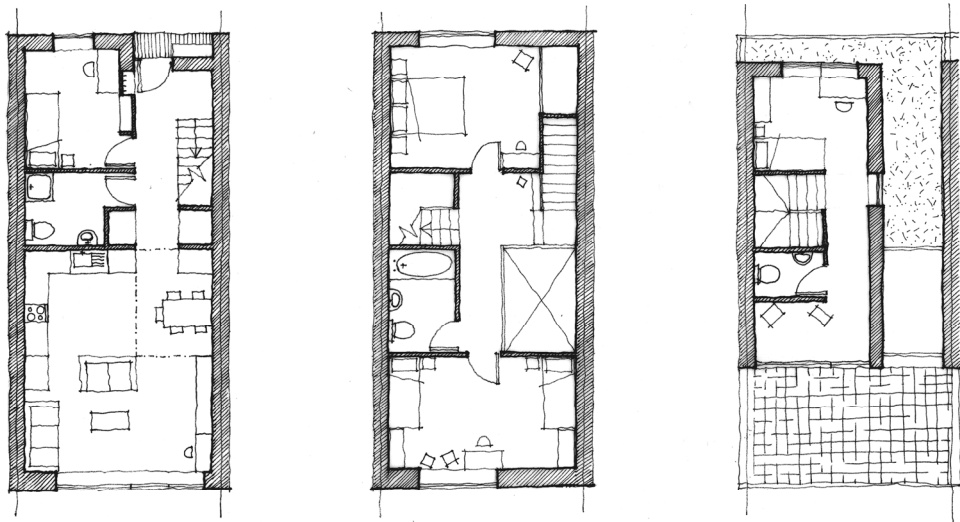
2 Storey, 2 Bed 4 Person Terrace – **83 m²**

(London Design Guide min. 83 m²)



2 Storey, 3 Bed 5 Person Terrace - **106 m²**

(London Design Guide min. 96 m²)



3 Storey, 4 Bed 6 Person Terrace - **128 m²**

(London Design Guide min. 113 m²)

Fig. 6.68 House type floor plans 1:200

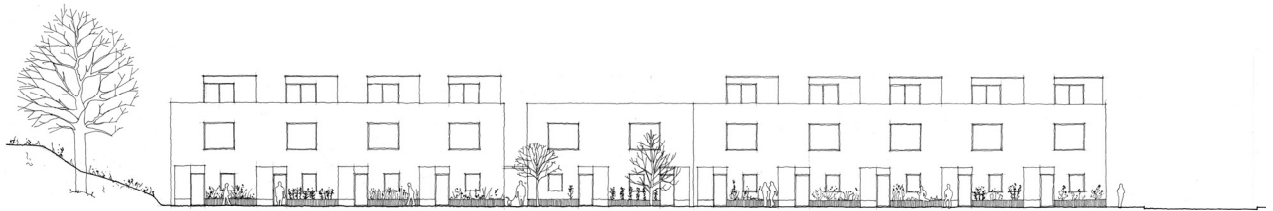
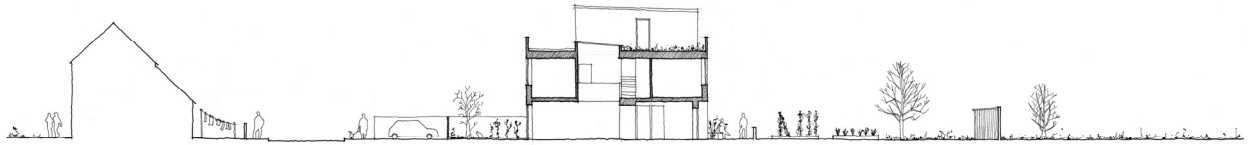


Fig. 6.69 Section through 4 bed house type 1:500; Fig. 6.70 North elevation 1:500; Fig. 6.71 South elevation 1:500

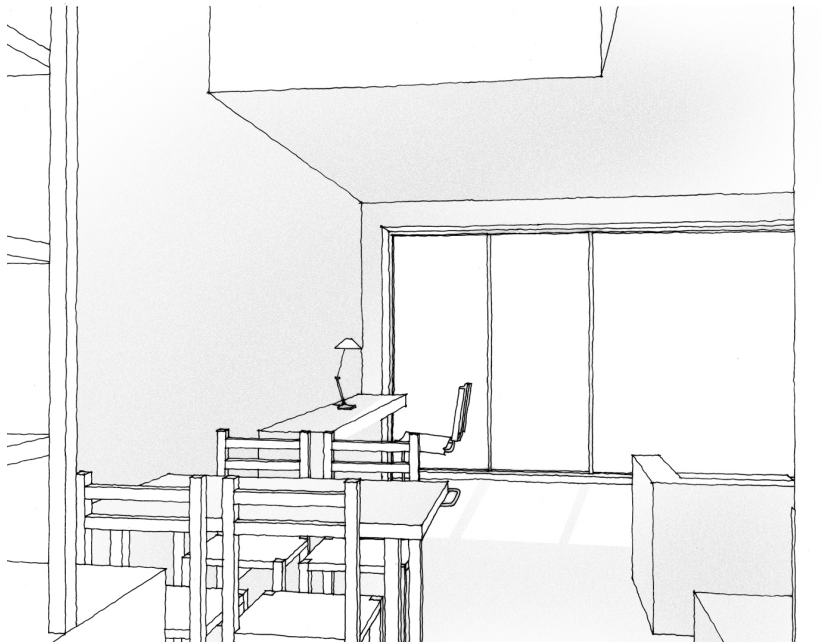
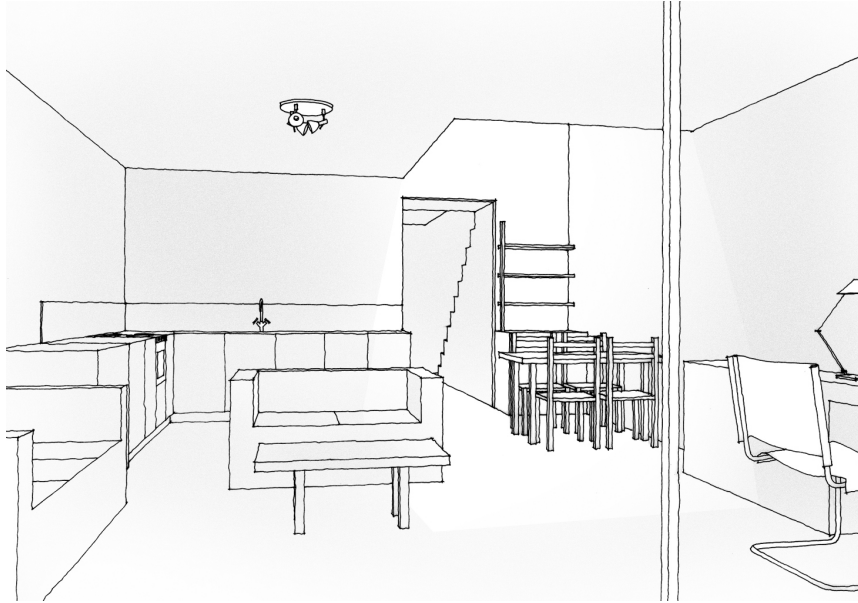


Fig. 6.72 Interior views of living room and kitchen

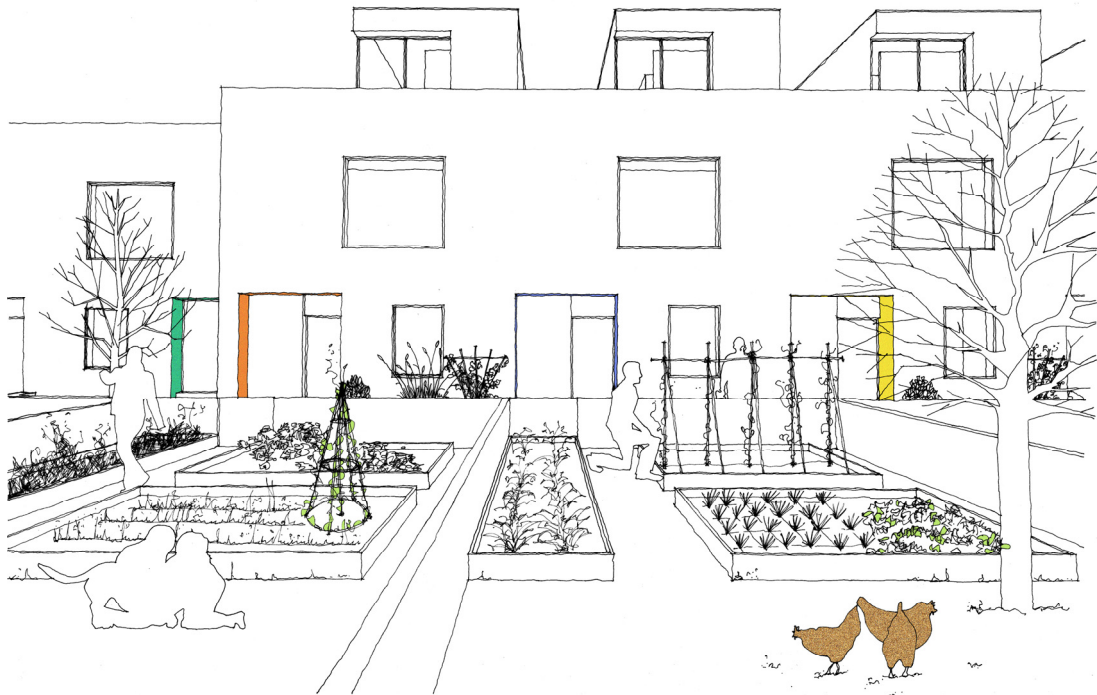


Fig. 6.73 Perspective of allotment gardens and north façade; Fig. 6.74 Pedestrian street to the house fronts and allotment gardens opposite

6.5 Review, analysis and reflection

6.5.1 Introduction

On reflection, a number of findings can be drawn from the revised model in design study 3. Again the model is analysed in terms of the outcomes of principles applied in this study and also in the process in which it was implemented. Each 'principle' on design was applied and 'tested' in a similar way to the previous study. However a different set of principles were adopted from the framework. The design was developed to functional standards and costs, applying greater emphasis on creating a reduced, simple form and aesthetics, whilst being influenced by aspects of inhabitation and communal living. The principles were given much more equal precedence in a more holistic approach to design in this study. This process in which the model was applied to the research is reviewed again in order to reassess the progression and form of the model for the concluding design study. The findings for each principle are set out below.

The design was shortlisted in the RSAW Redesigning the terrace competition in Wales (December 2012).

6.5.2 Design review through principles

- **Landscape and site**

The proposed design draws on the layout of early industrial workers' housing such as Taibach (adjacent to the site), Rhydycar and Gellideg and was developed through analysis of alternative layout options. The sketch scheme was not chosen solely for economic reasons, to fit as many units on the plot as possible, but rather for issues relating to surrounding density and grain of the place, as well as social factors of how people inhabit place.



Fig. 6.75 Terrace form fits into the grain of the place

The form of the terrace fits into its context by connecting to both the immediate and the wider setting and grain of the place. The landscape and siting goes beyond the physical issues of climatic and spatial restrictions and considers the dwellings as part of the landscape rather than objects in it, both physically and socially. The design is considered in detail in the individual dwelling forms and placemaking, whilst being part of the whole terrace in relation to the overall scheme and the wider built environment.

The form of the layout draws on a strong traditional precedent which has been adapted to today's requirements. Peter Stewart explains that 'A simple precept of place-making in housing design is that houses and flats should be brought together in identifiable groupings – terraces, streets, squares, courts and so on. This is one thing that is most lacking in the 'anywhere' housing beloved of volume housebuilders, with houses laid out apparently at random.'²⁷ He argues that 'places that feel like somewhere in particular rather than anywhere lies in the distinction between enclosure and openness in public routes and public spaces'²⁸, which can be created through designing tightly planned elements to avoid leftover space.

The siting of the terrace takes into account solar access, positioning the living spaces and private gardens to the south. It takes advantage of the climatic conditions, but it is not dictated by them as technological advances in materials and construction has meant that it is not as critical for form and orientation to be driven by climate. Later terraced housing and traditional mass housing began to ignore climatic issues. However it is important to utilise climatic conditions such as passive solar gain for environmental reasons, in addition to experiential motives of creating bright, sunlit spaces to inhabit.

The scheme layout differs from the studied examples of early industrial workers' housing, as the allotments and the communal street in this design are to the north of the site allowing the south facing façade to be more private with more secluded back gardens and roof terraces. The pedestrian street to the fronts of the dwellings and the open allotment gardens allow the community to interact with one another, whereas the back gardens and roof terraces allow the residents to retreat to their own private space. Car parking to the rear of the dwellings, allows the creation of a safe pedestrian street to the front. The landscaping and definition of boundaries and routes through walls and paving connects the terrace form to the immediate landscape and the wider context of the site.

▪ **Community and place**

As discussed above, community is central to the layout of the design, however there is a need to balance this with individual privacy. There is a hierarchy of different degrees of privacy and engagement with the community from secluded roof terraces and private back gardens to the sociable, more open allotment gardens to the fronts of the dwellings. Despite the close

²⁷ Peter Stewart, 'Place' in *Place and Home: the search for better housing*, ed. by PRP Architects (London: Black Dog, 2007), p.121.

²⁸ *Ibid.*, p.121.

proximity of neighbours living together, the design creates private areas as well as communal places for people to socialise in.

The threshold between public and private space is considered in detail in the scheme. Larry Ford in *The Spaces between Buildings* suggests:

There is more to the way buildings relate to the spaces around them than their windows, textures, signage, and other decorations. Beyond the "skins" of buildings are various and sundry protrusions, which serve to create an intermediate zone between building and the street. Such embellishments are the special places that constitute the boundary zone between inside and outside. Without them, the transition between the two can be abrupt and uncivil.²⁹

It provides a vital intermediate semi private/semi public space that is both part of the building and part of the street. Ford explains that:

Folk housing throughout the world exhibits the combination of territorial graduation and casual surveillance that has been described by Oscar Newman as "defensible space". For space to be defensible, there should be at least four clearly defined levels of territory separating impersonal main thoroughfares from personal dwelling or business. The ideal sequence is public space, semipublic space, semiprivate space, and private space.³⁰

To the fronts of the dwellings this gradual sequence of space between building and street is evident. Off the main road, the pedestrian street and small square provide a semi public space and forms the heart of the community. The semiprivate territory is recognised as the space from the low wall to the external wall of the dwelling, including the recessed porch. Beyond that is the private zone. The defensible space is defined using subtle elements, the low wall, planting and surface finishes suggesting the boundary of the territory. These elements do not dominate the house fronts, but subtly delineate space, creating an ordered boundary to the street.

The intermediate semi private/semi public space creates a place to the front of the buildings to sit and socialise with neighbours off the communal street. The low walls marking the boundary of the territory of the dwellings provides a place to sit. The porch provides a sheltered seat and protection from the elements as occupants and visitors enter the house. The opportunity to grow plants behind the wall provides privacy to the front rooms of the dwellings and allows residents to personalise their homes. These elements of the design start to help create a 'sense of place' and ground the scheme to its existing context.

▪ **Repetition and Identity**

In drawing on the terrace typology, repetition is key to the design. Repetition is economical and provides unity and order to the streetscape but is often considered as monotonous and boring.³¹ The different dwelling types use the same window sizes and proportions. However the design attempts to break up this repetition through the creation of a small courtyard. This is

²⁹ Larry Ford, *The Spaces between Buildings* (Baltimore, MD: Johns Hopkins University Press, 2000), p.40.

³⁰ *Ibid.*, p.50.

³¹ Stewart, p.123.

formed by setting the 2 bed dwellings back from the communal street in line with the rear elevation. The 2 bed dwellings are also handed to move the entrances away from the pathway leading to the rear of the houses, this subtly changes the rhythm of the street. Despite this, the repetitive nature of the terrace is retained and the street is enhanced by the interruption of the rhythm.

Stewart argues that homeowners can react against repetition in the form of customisation:

The better the balance between repetition and variety, it can be argued, the less individual homeowners will feel the need to change things. Visual coherence, which contributes to sense of place, relies on acceptance by individuals of a common visual language. But this is at odds with notions of individual liberty and probably, today, of the human right to cover your home in simulated random rubble. It is hard to exert aesthetic control over homes³².

Larry Ford adds that people should be allowed 'to make small changes in decoration or spatial arrangement of furniture or plants... Unbreakable, impersonal, institutional landscapes designed to be unmodified often bring out the worst behaviour in people, as they are challenged to make recognizable places through graffiti or vandalism.'³³

The dwellings are distinguished by different coloured porch reveals. Bright traditional colours including terracotta, yellow ochre, green and blue are used. Behind the low threshold wall the residents are able to arrange potted plants to present their own personal adornment to their properties. There is therefore a balance in attempting to provide identifiable and distinctive places at the same time as creating a coherence and unity in the design.

▪ **Economy and flexibility**

Elements of the design are economical, but the scheme is not controlled by economics. The dwellings are modest and the form is compact improving energy efficiency. The units are minimal and economical of space, but adhere to the London Design Guide space standards. Elements of the design are quite generous of space, such as the void and landing area which allows light to penetrate into the dining area from the skylight above, increasing daylight into the centre of the plan, reducing the need for electric lighting in the daytime. It also creates a more spacious place which could be used to store books and a place to sit and read. As referred to in the previous design review Ansgar and Benedikt Schulz suggest a balanced approach to design is more successful than one where quality, time or cost are more dominant.³⁴ In this project the economics of the scheme has not detracted from the quality of the design, but it has still been pushed in various directions.

The closed panel timber frame with exterior insulation and finish system (EIFS) of render is fairly simple and affordable to construct. The time required to erect the structure on site is reduced, through the use of pre-insulated panels, therefore cutting costs. The frame could be

³² Ibid., p.123.

³³ Ford, p.52.

³⁴ Ansgar Schulz and Benedikt Schulz, 'Simply Reasonable' in *Building Simply Two: Sustainable, cost-efficient, local*, ed. by Christian Schittich (Munich: Edition Detail, 2012), pp.34-41 (p.35).

constructed in Wales using timber sourced and manufactured in Wales and UK. The EIFS provides additional insulation and airtightness and substantially reduces heating costs as the EIFS wraps the exterior of the building in an energy efficient thermal blanket, which reduces heat transmission and thermal bridging.

The timber frame construction gives occupants the opportunity to alter and add to their dwellings in the future with ease as families outgrow their space. It draws on the traditional terrace approach of constructing 'add ons' to the rear of properties. The design allows for this to happen in a more systematic way to retain unity and clarity of the terrace. The concept builds on traditional practice, but is designed into the scheme rather than being a later ad hoc addition, where aspects of the design are compromised and unity of the street is lost.

The design is economical in the materials and construction proposed. However some aspects make the design much more costly such as the double height dining space with roof light above and the third storey increases costs. However these elements add to the design of the terraces houses in placemaking and comfort. The dwellings forms are also able to evolve and be extended with occupants changing needs, benefiting the life cycle of the houses in the terrace.

▪ **Simplicity**

The design gives the impression of simplicity as it appears refined and stripped back on the surface, through the repetitive form and simple, straightforward detailing. However as described above, the layout, form and cultural aspects are thoroughly considered giving the design layers of complexity, despite its appearance being simple. Jon Maeda in his book *The Laws of Simplicity* describes how 'simplicity and complexity need each other' as a way of addressing the increasing complexity of contemporary life.³⁵ Giovanna Borasi in describing architects Stephen Taylor and Ryue Nishizawa works discusses 'an architecture that is extremely sophisticated but simple in appearance, architecture that combines a highly refined design with a reality purged of unnecessary elements. I am not just referring to a formal fact, but to something apt to inform more profoundly the way of inhabiting the spaces they project.'³⁶ The design attempts to create simple and coherent spaces defining places to inhabit.

Stephen Taylor expresses, 'I enjoy the repetition of elements because of the kind of ordinary background quality that they can bring to the city. The city doesn't want every building on every corner to be shouting and screaming "Look at me!"'³⁷

³⁵ Jon Maeda, *The Laws of Simplicity: design, technology, business, life* (Cambridge, Mass.: MIT Press, 2006), pp.45-46.

³⁶ Giovanna Borasi, 'Visual Exchanges between the Privacy of the House and the Vibrancy of the Street', in *Some Ideas on Living in London and Tokyo*, ed. by Giovanna Borasi (Baden, Switzerland: Lars Muller Publishers, 2008), pp.92-103 (p.100).

³⁷ Stephen Taylor, 'An Intimate Urban Ideal', in *Some Ideas on Living in London and Tokyo*, ed. by Giovanna Borasi (Baden: Lars Muller Publishers, 2008), pp.106-157 (p.128).



Fig. 6.76 Model of a design for a terrace with a simple façade by Stephen Taylor

Despite simplicity in the appearance of the scheme, the hidden construction is complex, consisting of a multi-layered envelope. Christiane Sauer explains how wall structures have become more sophisticated due to increasing energy requirements. 'The load-bearing structure, insulation, waterproofing, and interior and exterior finishes form a coordinated system perfectly suited to each individual purpose.'³⁸ The closed panel timber frame is a relatively straightforward system which would be brought to site and erected in sections. To the outer leaf of the structure an exterior insulation and finish system (EIFS) of render is specified to increase the levels of insulation to improve U-values and provide the exterior finish and waterproofing layer. The system gives the impression of simplicity as it fulfils a number of tasks in one system; however it is built up of many layers making it much more complex than it first appears. The complexity within the construction increases the occurrence of errors and adds to costs but means the dwellings can achieve high energy performance.

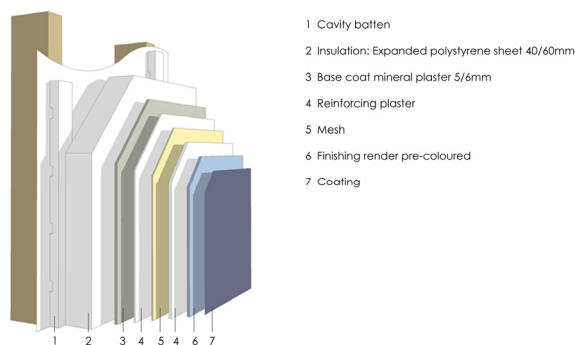


Fig. 6.77 Multiple layers of materials make up the exterior insulation and finish system of render

³⁸ Christiane Sauer, 'Simply Constructed' in *Building Simply Two: Sustainable, cost-efficient, local*, ed. by Christian Schittich (Munich: Edition Detail, 2012), pp.12-23 (p.15).

6.5.3 Findings

Again in this design study, the outcomes of the model are different from the previous two studies. The set of principles established are changed as the focus of the housing type is distinct from the other typologies. Certain principles emerge as being more fundamental to this type, but many of the same issues are demonstrated in all three types to varying degrees. The process in which the model was implemented in this design was similar to design study 2, however a number of findings were uncovered which were not recognised in the previous design. These findings on the method in which the model was adopted are discussed below, in relation to the conclusions discovered concerning the model as an 'entity'.

Initially, traditions of the terrace type were analysed with specific research into early industrial workers' housing in Wales, where vernacular traditions continued. Specifically Rhydycar and Gellideg were considered important examples of early industrial workers' housing as they possess a number of key attributes regarding siting, layout and communal aspects of design. They were crucial to the research as they show how adaptations and changes have been made to the dwellings over time. Gellideg demonstrates a terrace which is still inhabited but has been altered to suit occupiers' needs today. Rhydycar at St Fagans is interesting to examine because it has been reconstructed and displayed in various stages of its life, since it was first built, up until it was last inhabited. The study concentrates on its early form, but acknowledges its changes and adaptations. A range of other examples were studied and visited to gain a wider understanding of the development of the typology and features specific to each terrace form. A number of the examples examined have been demolished so research relied on existing literature in these cases.

As identified in the live work design study, it is important to understand traditions in terms of social aspects of living and how inhabitants used space. This was addressed through measuring, recording and drawing building form and semi-fixed elements, including furniture and objects. Rhydycar was drawn in detail as it was in 1805. This was critical to really understanding the form and construction, but most importantly how the building functioned in terms of inhabitation.

Exemplar contemporary housing projects incorporating traditions of the terrace form in design are identified in England, as there is a lack of appropriate examples of best practice found in Wales. This was also an issue in the previous study. However traditions of the terraced house found in the rest of the UK are transferable to Wales as general concepts and forms are comparable. It is acknowledged in literature that the contemporary terrace has derived from traditions of this typology. However more subtle aspects which can be seen to relate to tradition are not accredited as doing so. This may be because they were done intuitively. These aspects of design may be ingrained in designers' expertise and principles may have been gathered instinctively and unconsciously rather than learnt. This could be the result of the type being a common feature across the UK in its various forms that we are all familiar with.

The contemporary precedent studies on the terrace are therefore very relevant to this model as the forms relate more directly to tradition. The contemporary case studies also address issues of space standards and sustainability and are built primarily for affordable housing. The briefs for the case study examples consider parallel issues to those dealt with in this design study.

In formulating the new model, it was recognised that the fundamental principles of design have changed again from the previous models of the individual rural house and live work types. This is because different priorities have influenced and determined how the terrace form has been shaped and evolved. The hierarchy of needs was modified again to establish a new set of principles from the literature and contextual study for design. Again this set of principles is different from the previous studies, though there are some strong influences that are common in all the typologies. These include location, siting and simplicity.

Whereas in the pilot study principles were addressed more literally and in the second design more conceptually, principles of the terrace tradition were adopted quite abstractly but with reference to specific details and ideas. On reflection this appeared to be a more comprehensive method.

The brief was then determined, with reference to the contemporary examples of best practice. The exemplary designs studied were useful in helping to come up with an appropriate brief as they all address affordable housing needs and could be analysed against the conditions of the site and context in this design study. As a client was unable to be set up to oversee this project, the case studies were more heavily relied upon for guidance and the brief was formulated through initial feasibility studies to make it more viable. This also benefited the proposal because compared to the previous study it was much less biased towards certain principles, such as economy. The chosen site with fewer constraints provided more freedom to test different applicable layout schemes and it did not entail onerous planning restrictions, as in the design of the live work units.

A more holistic approach to design was taken in this scheme and principles were referred to for guidance and were given much more equal precedence. Economy of the design was considered but not at the expense of attention to social and cultural aspects. The landscape and siting in the scheme goes beyond physical issues of climate, to address factors of placemaking in relation to community and individual identity. The terrace is therefore more integrated in its setting both physically and socially than in previous studies. This was the result of more thorough site studies and more emphasis on design of immediate outdoor space in relation to building form.

On reflection, this design was more successful than the previous two studies. This is partly due to a continuation of traditions of the terrace type in contemporary design, providing evidence how the type can still be applicable to design today. It is also due to a better understanding

of how the model as a process could be utilised in design. This is including external factors that affect the model involving site, client, brief, regulations etc. and principally the author's own architectural standing. In the previous studies the author deliberately took a neutral role and did not allow personal preference to dictate design. However, it should be acknowledged that this was impossible to implement and much of the designer's influence was still present despite this. This study highlights that a designer's influence and architectural position on the model is critical.

The design principles were considered in a similar way to the previous study and were followed as guidance. Ideas were integrated and considered together to enhance one another. The principles were applied to design abstractly and in a quite generalised way in some instances and much more specifically, relating to details of tradition in other instances. This proved to be a much more successful way to employ principles to design, as it meant that some of the more unusual specifics and intricacies of tradition were not lost, but re-appropriated in the contemporary.

Despite attempting to apply principles with equal emphasis to design, the study demonstrates how some principles were much more instrumental in contemporary practice than others. These fundamental principles were quite different to the other studies, as the result of a unique typology, site and brief. In parallel with the other types, location and siting are important to the terrace typology, in terms of layout and arrangement of houses in relation to the wider community and amenities. Climate and orientation are also important to the study, but these factors did not prescribe the layout of the proposal from the outset, but were considered alongside other more determining principles. There is no longer a necessity for form to be dictated by climate and orientation as in the siting of traditional longhouses, but there is relevancy to adopt principles where possible. Similarly to the live work study, connection to the wider community is influential to the model of the terrace and concepts surrounding this principle are furthered in this design. There is also greater emphasis on the individual/occupiers and how they interact with the neighbourhood. These ideas are enforced in the design of the immediate context to the terrace and the connection between the house and the wider built and social environment. The ideas of public and private are reassessed in this design with greater success. Similarly to the previous design, flexibility is addressed in the literal addition of accommodation in the tradition of building 'add ons'. Finally economy is important in order to produce affordable dwellings. However this principle is far less instrumental to the design in comparison to the previous designs, as it was imperative that other factors were not overlooked, at the expense of affordability.

This demonstrates how general principles of tradition run through all the typologies; however some appear to be more instrumental than others. There are also specific ideas which are unique to the types. Therefore the model contains many inconsistencies, which may alter slightly depending on the application to specific traditions and places.

From these findings the model will be redefined further to test in a final design study, which will readdress the way the model is employed as a process in design and incorporate and build on the principles developed in the model as an entity.

Final study

7.0 Edge of rural settlement

7.1 Introduction

In this final study, the model is modified and tested in the design of a group of dwellings on the edge of a rural settlement. The study recognises a need for this type of housing in the contemporary and draws on previous studies on tradition to inform it. There is an identified need for groups of houses in rural communities, acknowledged through Local Development Plans (LDP)s in place across Wales, which set out proposals and policies for future development and land use, 'considering the long term impact of development on communities and landscape.'¹

David Lea and others recognise a need to find design solutions to housing in rural areas and on the edge of settlements. Lea argues 'there's a big threat of local traditions getting smaller and they're all being overwhelmed by housing estates... our environment now is dominated by endless really thoughtless house estates... The important thing to look at is how housing could be done better'.² He recognises that there are numerous exemplars of single dwelling designs and these don't provide a practical and affordable resolution to housing need in rural locations.³ Phil Roberts, Chief Executive Officer of Warm Wales and formerly Deputy Chief Executive of Ty Gwalia, one of Wales's biggest social housing providers, similarly argues against the use of standard pattern book house types. He recognises that this 'dictated approach to the production of houses and place-making was ruining the housing architecture of Wales.'⁴ The design study aims to find an alternative solution to affordable housing needs from development of autonomous, pattern book housing estates with the objective of retaining a connection with local traditions.

The design for a group of dwellings on the edge of a rural settlement utilises knowledge from previous studies into the vernacular, including the farmhouse (longhouse), cottage (workplace dwelling) and terrace (early industrial workers' housing) typologies. Aspects of these housing types and additional fieldwork and visits carried out for the final design are used as precedent.

The research method of this final study will be undertaken as the previous designs, but modified in the light of them. A number of areas of study were identified as requiring additional exploration, involving the definition of principles and a deeper development of the design process. These areas of study include a more holistic method of surveying tradition, involving a

¹ Brecon Beacons National Park <<http://www.breconbeacons.org/the-authority/planning/strategy-and-policy/what-is-a-development-plan>> [accessed 3 December 2012]

² David Lea interview

³ Ibid.

⁴ John Carter, 'A Client of clients: The architecture of homes in Wales has lost one of its major patrons', *Touchstone*, 18 (2011), 9.

wider review of literature and more detailed personal observation, with greater emphasis on cultural aspects of tradition, inhabitation and placemaking. A more thorough way of analysing site beyond the obvious physical attributes was recognised to demand more study. Contemporary precedent reviewed in the earlier studies were useful, but lacked an understanding of how the designers went about the design process and the overriding principles and philosophies that drove them to design with influence from traditions. These issues will be addressed in this final design study through learning from best practice and in an alternative approach to fieldwork. This will involve staying in traditional cottages to understand how buildings can be inhabited, interviewing architects and interrogating their design philosophies and processes. It will also entail attendance on the Glenn Murcutt Master Class in Ireland to learn from architects including Richard Leplastrier, Peter Stutchbury and Juhani Pallasmaa, recognised for designing and building, based on tradition and innovation.⁵

⁵ Architecture Foundation Australia < <http://www.ozetecture.org/tutors/australian-tutors/> > [accessed 26 September 2013]

7.2 Learning from best practice/fieldwork

7.2.1 Introduction

This final design project draws on lessons learnt from vernacular housing in Wales gained in foundation studies on the individual rural dwelling, the workplace dwelling and the early industrial workers' terrace. Research is extended by carrying out a holistic literature review and contextual study to gain a greater understanding of the context of the design study. This is achieved through further investigation and fieldwork, building on previous studies. The design process is interrogated through learning from best practice. A number of architects/designers are interviewed to acknowledge their design philosophies and methods of designing in recognition of the vernacular.

In the previous studies traditional building types researched were visited during the day and examined over a relatively short period of time to gain an understanding of the places in which they are located. With a view to understand how the buildings can be inhabited, the author stayed in two cottages in Carmarthenshire for a period of two/three nights. They were chosen to visit because they have been renovated to reveal their original, simple form and traditional features have been retained. Minimal contemporary amenities and comforts of living have been introduced and where they have they are noticeably new and innovative to provide a distinction. The new addition which has been built at *Bryncyn* is relevant to the study as it reflects the simplicity of the traditional form, together with creating a connection to the wider landscape. It is an example of best practice which has been widely published. The cottages stripped back to their simplistic form and materialities, with original features juxtaposed against innovative contemporary additions, are studied in terms of inhabitation and experiential response to place, which has yet to be fully researched and understood in this thesis. Inhabiting the cottages also demonstrates how traditions have moved on and where traditions still retain a relevancy today.

The first cottage visited was *Bryncyn* near Tanglwst in Carmarthenshire, a traditional two up two down rural cottage, with a minimalist concrete extension to encompass the essential modern amenities of a wet room and kitchen/dining room. The innovative renovation was designed by the owner of the cottage Dorian Bowen, who trained as a quantity surveyor. The minimal and modernist extension mirrors the simplicity of the traditional cottage it adjoins in an innovative way, accounting for the changes in how people live today. In addition to inhabiting the cottage for a period of time, the author also interviewed the designer to interrogate ideas behind the restoration of the cottage and extension, as well as understanding the designer's approach to the architecture.

The other cottage the author spent time at was *Bryn Eglur* near Narberth, Carmarthenshire, also owned by Dorian Bowen. *Bryn Eglur* contains many more traditional surviving features than *Bryncyn* including an original open wickerwork chimney hood and box bed. The two visits

enabled the author to inhabit the dwellings and experience place in greater depth in terms of spatiality, materiality, and ambience at different times of the day and night, different weather conditions and times of the year.

Contemporary precedents examined in the foundation studies primarily consisted of specific buildings that contain relevant links to the typologies studied, and maintain a connection with tradition. The building studies accessed siting, form and arrangement, materials and construction and environmental issues and did not consider the theoretical approach taken by architects and designers and their reasoning for applying a certain practice to design. Throughout the research it has been noticeable that the literature and critical reviews of key buildings often focuses only on the finished building. The method in which designers carry out their theories in practice has been omitted in the research so far. This is rectified in this study and consequently, a number of architects are interviewed with an aim of finding out how they approach design as a reinterpretation of tradition. The architects questioned are Mary Arnold-Forster from Dualchas Architects, Alan Dickson of Rural Design, both from architectural practices based on the Isle of Skye and David Lea who practises in Wales. The architects interviewed were questioned about the nature of their practice, their design philosophies in terms of tradition and innovation and their design process, with the objective to gain a fuller appreciation of how they carry out their design principles in reality. Examples of buildings designed by the architects are visited to relate how their ideologies and methods of working are applied to built examples.

In addition to analysing the works of architects and designers practising in the UK, the author attended the Glenn Murcutt Master Class in Glencree, co. Wicklow, Ireland led by Australian architects Richard Leplastrier and Peter Stutchbury, along with Finnish architect Juhani Pallasmaa. The master class involved a design 'charette' undertaken in small groups to design a place of dwelling and workshop for an artisan on the site of a ruined agricultural shed nearby the Glencree Reconciliation Centre. The studies applied and tested how the languages of the architecture of the Australian coastal regions could be translated to the rugged, windy and colder climates of Ireland. Studies involved an exploration into the moderation between inside and outside in Australian architecture and how this might be translated in harsh European climates and locations. The Australian architects gave talks throughout the week on their experiences and projects in Australia and other parts of the world and Juhani Pallasmaa spoke about place, atmosphere and architecture. The master class covered aspects of design such as specifics of siting and climate and the creation of ambience and place, which were highlighted on reflection in the foundation studies as not being carried out as thoroughly as they could be in the initial design studies. The master class gave the opportunity to study these ideas further.

The next sections of this chapter discuss the outcomes of interviews with Dorian Bowen, Dualchas Architects, Rural Design and David Lea in terms of the designers' philosophies and design processes, in relation to built examples. These interviews are used to test the

operational framework of the model and also the knowledge and understanding gained on the Glenn Murcutt Master Class.

Alongside interviewing designers and carrying out fieldwork, research was developed on the cultural elements of tradition and specifically myth and tradition surrounding the Welsh house. This was undertaken to develop these aspects of tradition further as it was recognised in the foundation studies that cultural aspects of tradition are significant, despite often being less recognised and implemented in contemporary design. These ideas were presented at an IASTE conference on Myth and Tradition in Portland, Oregon.

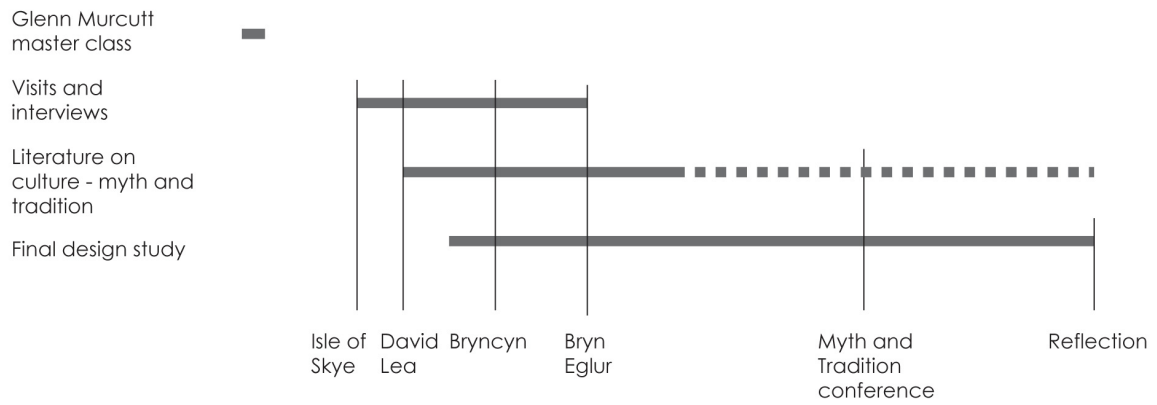


Fig. 7.1 Process diagram/timeline of learning from best practice and fieldwork

7.2.2 Bryn Eglur and Bryncyn

The cottages *Bryn Eglur* and *Bryncyn*, situated in Carmarthenshire, were visited and dwelt in to experience the sensual qualities of the cottages throughout the day and night, in different seasons. This was carried out to observe how these experiential attributes could benefit contemporary design. The cottages were identified as suitable examples to inhabit as they are reduced to their simplest forms and many traditional elements have been retained with only basic and necessary facilities added. The extension at *Bryncyn* is of value to analyse as it demonstrates an application of building simply comparable to traditional form. The cottages were visited, inhabited and the owner and designer of the extension Dorian Bowen was questioned about his ideas behind tradition and innovation, and the application of his theories in design. These ideas are compared against the operational framework.

Bryn Eglur (clear hill), a 17th Century cottage near Narberth was restored by Dorian Bowen in 2004 in a simple and traditional Welsh vernacular style using a combination of his childhood memories growing up just a mile away from the cottage and research undertaken at St Fagans National History Museum. Bowen recognises how in his lifetime he has seen cottages disappearing in the landscape and wanted to find something he could preserve. He trained as a building surveyor and practiced in London for a number of years before moving back to Wales.



Fig. 7.2 *Bryn Eglur*, Narberth, Carmarthenshire; Fig. 7.3 Inglenook fireplace; Fig. 7.4 Box bed

Ten miles from *Bryn Eglur* is *Bryncyn* (hillock) near Tanglwst, a former two up, two down cottage and cow shed which has been stripped back to its simplest form and extended to house modern amenities in a minimalist board marked concrete addition. Unlike *Bryn Eglur* with its many significant traditional features, *Bryncyn* lacked these, so Dorian Bowen took the opportunity to push the boundaries of design further to bring it up to date with today's living standards in an innovative extension.



Fig. 7.5 *Bryncyn*, Tanglwst, Carmarthenshire; Fig. 7.6 Hearth and contemporary settle; Fig. 7.7 Minimalist concrete extension

Design principles

Dorian Bowen's design philosophy is analysed against the operational framework in this thesis, including site, construction, form, culture and economy.

Bowen acknowledges that there are lessons to be learnt from vernacular responses to climate, siting and orientation, in order to take advantage of site conditions. Despite these issues being less applicable to the restoration projects, he principally advocates the value of orientation being towards the south as a strong influencing factor for design today. However he recognises how new technologies and changed ways of living have meant that some of the principles of the vernacular have become less significant. At *Bryncyn* the back wall is removed to provide a stronger relationship with the outside, to bring more natural light inside the house and to adjust to changed ways of living, where people embrace eating outdoors more. This is made possible by advances in construction and technology.



Fig. 7.8 *Bryn Eglur* sited amongst the trees in the Carmarthenshire hills

Development of materials and construction are fundamental to the design of the extension at *Bryncyn*. Dorian Bowen describes how there is a place within traditional form to break away from established types of construction. At *Bryncyn* Dorian uses concrete in the extension which gives the original form stability and allows for the new form to be pushed to its limits. He explains how 'our ancestors went through periods of moving on and modernising within the periods, it just seems like a natural and sympathetic way of giving a new lease of life to the building.'⁶ The traditional methods of construction in the house had certain limitations, whereas concrete allowed for a stronger relationship with the outside to be expressed using large spans and cantilevers. The choice of materials and construction was therefore important in relation to aesthetics, light and experiential qualities of space, in addition to practical considerations, which guided the approach. These were for example the speed of construction, insulating properties of the concrete and the fact Dorian Bowen's brother works in the concrete business, which helped to justify the necessity to move construction techniques on. In terms of resources, Dorian Bowen believes there are lessons to be drawn from the fact that our ancestors relied a lot more heavily on what was readily available. It is evident that Bowen utilised the knowledge and skills available locally from his brother. *Bryncyn* demonstrates innovative craftsmanship in the skills of making formwork and casting the concrete.

⁶ Dorian Bowen interview

Simplicity of form is an instrumental principle behind the cottages and particularly the contemporary extension at *Bryncyn*, which is rooted in minimalism and strongly influenced by the work of John Pawson. Dorian describes how he took away what was unnecessary from the building to the point where he then started adding aspects back to make it a habitable space once again. Simplicity in the aesthetics is also transferred to the building construction, which comprises the use of one material for the wall construction in parallel to the rubble stone walls of the cottage. Composition, modesty and abstraction of form are important, whereas opportunity for occupants to add identity and creativity to form is much less evident.



Fig. 7.9 New extension at *Bryncyn* stripped back to a minimalist and simple form; Fig. 7.10 Simple and straightforward construction of old cottage

Cultural elements of the cottages have been retained in the traditional forms at *Bryncyn* and *Bryn Eglur*. The fire and the hearth are significant and dominating features of the dwellings and Dorian Bowen believes that they still provide a strong connection with the past. He argues that substantial change in heating requirements and the removal of the hearth from dwellings today means that there is something missing from the heart of homes.



Fig. 7.11 Inglenook fireplace at *Bryn Eglur* with wicker fireplace hood

The new extension at *Bryncyn* does not reference cultural aspects as evidently in design. However experiential qualities and sense of place are evident in the design, fundamentally in textural qualities and light. These qualities reflect and contrast with the original cottage form where textural surfaces of materials are exposed in different ways. Plaster is stripped back in places to reveal the stonework, but retained where there are the remains of old wall paintings. A rough wooden door with layers of flaking paint is left to contrast with a newly painted staircase. In a similar way Bowen shows an attention to detail and textural qualities of new materials in the extension. Sandblasted and horizontally laid wooden boards are used as shuttering for the concrete to create a textured wood grain effect to the walls which contrasts against the polished concrete floor and the large expanse of glass.



Fig. 7.12 Contrasting textures of interior; Fig. 7.13 Wall paintings on plasterwork covering exposed stonework in places; Fig. 7.14 Layers of paint left on the wooden walls of the staircase; Fig. 7.15 Textured board marked concrete of new extension

Despite understanding that cultural tradition still holds significance in design today, Dorian Bowen recognises that functionally 'there are certain aspects within traditional form that rendered themselves at the end of their life'⁷. At *Bryncyn*, he consciously decided to take away everything that was now unnecessary in the building until structurally no more could be taken away, leaving only traces of the old interior and some distinctive features. At the same time, new utilities such as a kitchen and a bathroom were required as the traditional form did not accommodate these facilities.



Fig. 7.16 New amenities at *Bryncyn* showing a contrast of old and new; Fig. 7.17 Rough and smooth textural surfaces; Fig. 7.18 A connection with inside and outside; Fig. 7.19 Contemporary use of materials against the traditional

In addition to this Bowen recognises that there are principles that can be drawn from the functionality of tradition and in particular the concept of one room living. He regards that the overall size of the traditional form is very compact, and simply enlarging space doesn't necessarily improve things. He questions the need for a four and fifth bedroom in new housing and suggests 'looking back at some of the solutions that our ancestors came up with'⁸ to address housing issues for today. He stresses how these were innovative at the time and could be adapted to remain relevant for today. In Dorian Bowen's design principles he retains a compact and functional spatial arrangement from tradition. In terms of economy of means the minimalist nature of the new extension relates to the adjoining minimal traditional dwelling form. In the design, principles of flexibility and repetition are not evident and affordability is not an issue.

⁷ Dorian Bowen interview

⁸ Dorian Bowen interview

Design Process

The method of designing the extension at *Bryncyn* involved elements of the model employed in the thesis. However the contextual study of tradition was established in the cottage itself. Aspects of the design were drawn from contemporary practice, from inspiration gathered from periodicals, magazines and particularly the internet. Dorian Bowen describes how in the design process he didn't follow a standard set of principles, but spent a large amount of his time designing his concepts, in which to employ in the design. Several drafts were drawn up until an appropriate solution was reached to develop further in detail design studies and in full scale material experimentation.

He emphasises that it is key not to alter the design once the final decision is made, so it is important to carefully consider the requirements at an early stage.⁹ The design for *Bryncyn* was worked up to a considerable amount of detail. The infrastructure had to be incorporated into the cast in situ concrete walls and in order to achieve a minimalist interior these aspects were critical from an aesthetical position. There were also practical considerations to do with the logistics of getting water and electricity to the site that influenced the design from the beginning. These significant outside influences on design are not explicitly recognised in the model employed in foundation designs in the thesis.

During the design process Bowen was also able to experiment with different ways of finishing the concrete and explore how far to push the boundaries of cantilevering elements. This led him to sand blast the timber to enhance the appearance of the grain. The opportunity to carry out these experiments allowed Bowen to drive his concepts to a realised form. These 1:1 experiments provide an additional level of the design development, beyond sketching, drawing and modelling, in the model in this thesis.

It can be seen that the design and outcome of *Bryncyn* closely followed Dorian Bowen's design philosophy through detailed investigation and experimentation of concepts and materials.

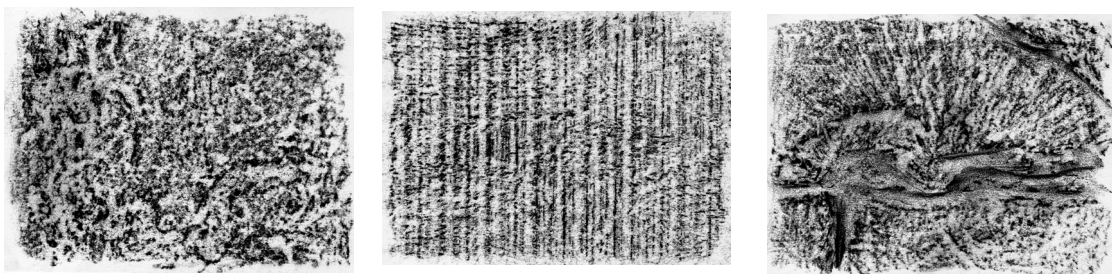


Fig. 7.20 Charcoal rubbings of textural surfaces at *Bryncyn* including concrete flooring; Fig. 7.21 Board marked concrete walls; Fig. 7.22 Slate floor slabs

⁹ Dorian Bowen interview

7.2.3 Dualchas Architects

The Isle of Skye was visited by the author because there are numerous exemplar and award-winning houses designed by Dualchas Architects based on the island, which appear to draw on the principles of tradition, specific to the place in which they are located. Architect Mary Arnold-Forster from the practice was interviewed to find out how their design philosophies are implemented in design and the process in which they work, in relation to the model applied in this thesis. A number of their works were visited to observe how they have applied their design theories in practice. The philosophies and design process are compared against the working framework in the research.

Dualchas Building design was founded by brothers Neil and Alasdair Stephen on the Isle of Skye in 1996. Dualchas comes from Gaelic, meaning 'cultural inheritance', which highlights the practices attitude to design as a continuation of tradition. Architect Mary Arnold Forster joined the practice in 1999 and in 2006 Dualchas set up another office in Glasgow. The practice was renamed Dualchas Architects in 2012.

Design principles



Fig. 7.23 Traditional blackhouse on the Isle of Skye

Landscape, site, orientation and climate are fundamental to the works of Dualchas Architects, who learn from the siting of traditional blackhouses. They are influenced by the low lying, simple forms, which sit tight to the landscape for protection against strong winds. In addition to traditional values, the relationship between inside and out is influential to their principles of design and the framing of views of the landscape. A combination of expansive views from ground to sky and others framing specific landscape features, such as a ridge or tree are exploited where possible.



Fig. 7.24 Siting in the landscape of Tigh Port na Long, Aird of Sleat, Isle of Skye; Fig. 7.25 Responsive to climatic considerations; Fig. 7.26 Simple form of one material



Fig. 7.27 Interrelationship between landscape and dwelling at The Shed; Fig. 7.28 Form has shutters to provide protection from the weather and for storage; Fig. 7.29 Form is responsive to site and climate with external solar shading

Materials and construction are important to Dualchas Architects, in terms of practical considerations and aesthetic values. The practice aims to use a limited pallet of materials, of a maximum of two materials if possible to achieve simplicity and restraint. Mary Arnold-Forster explains how the practice would use local materials over imported if it was possible, but she maintains that there is no simple solution to the issue:

Incredibly expensive sheep's wool insulation, like organic food, is really still only for the rich – like organic food. Thin foam insulations are extremely efficient but can be poisonous. Chinese and Indian slates are far more easily and cheaply available in Inverness showrooms than Caithness or Ballachulish slates.¹⁰

In terms of sustainable technologies, she describes how they can be an expensive gadget if wrongly specified. To Dualchas, sustainability is more about 'a well insulated, simply planned building that exploits the power and joy of the sun... building homes and communities that are built to last and that people enjoy living, gathering and working in.'¹¹ Dualchas Architects therefore adopt a quite rational and pragmatic approach to issues of sustainability, materials and construction. They use local builders to construct their projects, but building resources are imported from further a field.



Fig. 7.30 The Shed, Tokavaig, Isle of Skye is sited to make best use of landscape and views; Fig. 7.31 It is highly insulated and economically clad in corrugated fibre cement and larch, with sliding shutters to protect from storms

¹⁰ Mary Arnold-Forster, 'Highlanders have long travelled' in *Architecture in Scotland 2006-2008: Building Biographies* (Glasgow: Lighthouse, 2008), pp.152-3.

¹¹ *Ibid.*, pp.152-3.

Simplicity and form are fundamental to Dualchas Architects' projects. They draw on the scale and modesty of traditional forms in the landscape. Simplicity in design is pushed further in projects where the Presbyterian religion is strong and the community share a sense of 'dignity, quiet and respect.'¹² Dualchas Architects approach is for well proportioned, simple and restrained forms in the landscape. Principles relating to identity and creativity of occupants are not particularly evident in Dualchas' works, but the practice works closely with their clients in developing a brief.

Cultural aspects of design are fundamental to Dualchas Architects, who have specifically sought inspiration from the blackhouse, 'the true vernacular of the highlands'¹³ in their architecture. They describe their aim is to design in a way that is 'unmistakably Highland, yet modern'.¹⁴ Internally their houses reflect the open-plan nature of blackhouses. The kitchen is central, the heart of the Highland home and a fire acts as a focal point to the living area. As with the blackhouse, the main spaces are often open to the apex of the roof. However, in describing the cultural aspects of design, Mary Arnold-Forster explains 'It's not all physical, it's also imbedded in the building. It's very rarely articulated. No one writes about it. It's in the culture.'¹⁵ To help develop this understanding of the place and culture, she discusses the importance of generating a dialogue with the local community and with the builders.



Fig. 7.32 The hearth is central to the home at The Shed; Fig. 7.33 Staircase wraps around the hearth; Fig. 7.34 Framed window seat is positioned towards views of the Cuillin Mountains

In the re-appropriation of cultural elements of tradition in design, a sense of place is created in the architecture by Dualchas, which some consideration of experiential and textual qualities of place and lighting.

¹² Dualchas Architects, *Boreraig, Glendale, Isle of Skye* <<http://www.dualchas.com/Boreraig.html>> [accessed 26 November 2012]

¹³ Dualchas Architects, *Heritage* <<http://www.dualchas.com/heritage.html>> [accessed 26 November 2012]

¹⁴ Ibid.

¹⁵ Mary Arnold-Forster interview



Fig. 7.35 A place to seat and read by the fire at The Shed; Fig. 7.36 Kitchen at the heart of the house

Economically, Dualchas considers there are aspects of traditions of the blackhouse that are relevant to current affordable housing needs. Despite the blackhouse still being regarded by some 'as a symbol of backwardness and poverty - little more than a shelter,'¹⁶ Dualchas understands the blackhouse to be 'a marvel of purpose building in appalling economic and social conditions and an inspiration for a modern Highland house design.'¹⁷ They understand:

tradition to be an evolving thing, with the best elements of the past being altered by advances in building techniques allied to changes in social and cultural patterns. A living tradition would see established patterns of building altered by modern concerns such as orientation towards landscape and view, blurring between internal and external spaces, more open plan living and a consciousness of energy matters.¹⁸

Taking lessons from the blackhouse however has meant retaining some of the basic and functional principles, but adapting them to suit today's living standards. Mary Arnold-Forster describes how development from tradition must 'be affordable and make living easier, as 'through history people have strived to make their own burden easier.'¹⁹ Function and use are therefore critical to Dualchas Architects' design principles. Principles of flexibility and repetition are not evident in their individual dwelling designs.

Design process

Mary Arnold-Forster discusses how Dualchas Architects in practice don't use a model for design, but she considers that they follow a similar approach to Rapoport's model of analysing tradition rather than copying it. She argues that in academia you are not actually doing it whereas in practice you have to get on with it and through experience it becomes second nature and intuitive. She explains how there is not a hierarchy to how she designs as it is much more subtle than that. But Mary Arnold-Forster believes that the most important thing is for a house to be a good, fun place to be and it's about gathering people together.²⁰

Dualchas Architects approach to carrying out their design philosophy has involved years of studying traditional blackhouses and white house plans, through drawing them to understand the proportions and scale and how they sit in the landscape. They have furthered their

¹⁶ Dualchas Architects, *Heritage* <<http://www.dualchas.com/heritage.html>> [accessed 26 November 2012]

¹⁷ Ibid.

¹⁸ Mary Arnold-Forster, 'Highlanders have long travelled' in *Architecture in Scotland 2006-2008: Building Biographies* (Glasgow: Lighthouse, 2008), pp.156-7.

¹⁹ Ibid., p.157.

²⁰ Mary Arnold-Forster interview

knowledge of the various types found across the highlands through work on refurbishment projects. From their understanding of how these buildings work, principles have been abstracted and moved on in new design. This aspect of their design process compares with the initial contextual study of tradition undertaken in the model in this thesis. However it is recognised that their knowledge of tradition has developed over a long period of time through practical experience and learning. With regard to contemporary precedent, Mary Arnold-Forster dismisses being influenced by what other architects are doing. She acknowledges that she spends very little time looking at magazines and the practice tries not to be self-conscious about their work. However she admits much of her architectural influences are still evident in the designs.

She describes how understanding and analysis of site is critical, to know the culture, landscape and place before embarking on design, whether through having either cycled or paddled or walked it.²¹ Initially one of the most important site visits is how to settle a building into the landscape. A site visit involves thoroughly recording, photographing and sketching, not only built form including agricultural buildings and domestic buildings, but all aspects of the landscape and any incision made by man on the landscape. This is in order to build a picture of it and then find a solution to it. Mary Arnold-Forster attempts to visit the site for a project in as many conditions as possible, particularly at dawn in autumn to see the quality of light and the passage of it. She feels they have a responsibility to their clients, but also a responsibility to the landscape and in making the ordinary a bit better in their buildings.²²

The dwellings are principally designed to work and meet the brief. Mary Arnold-Forster explains that the struggles of the office are mostly practical and not about design or concept; they are about trying to get the building finished or managing the clients' expectations. However the practice is particularly interested in the concept of home and what people think of as home and how that defines the clients' brief. Despite not following a model for design, it is evident that principles from Dualchas Architects' design philosophy, based on traditions of the blackhouse are a major influencing aspect of design, in addition to developing an understanding of the site and making sure the brief is appropriate for the client's requirements.

²¹ Ibid.

²² Ibid.

7.2.4 Rural Design

In addition to interviewing Dualchas Architects on the Isle of Skye, Alan Dickson from Rural Design was also interviewed and their design approach and method interrogated. The practice has produced a number of successful award-winning dwellings, which can be compared alongside the projects by Dualchas. Both practices appear to hold differing architectural values, despite being rooted in the same region. Some of their building projects were then visited to compare the outcomes of the designs, with the architectural theories of Rural Design. These ideas are evaluated against the operational framework of this thesis.

Rural Design is an established architectural practice based on the Isle of Skye, who undertake projects throughout the Highlands of Scotland and further afield. Each project is based on a rigorous study of the landscape and site context along with an analysis of clients' requirements. Their work is grounded in an understanding of the history of a place and a respect for the environment.

Design principles

Site and landscape are fundamental to Rural Design's approach to building, including principles relating to orientation and climate. Their architecture is about the contexts in which they are designing. Alan Dickson explains:

it's not just about history or landscape. It's also the weather, and the skills that we have, and there's a whole kind of mash-up of circumstances here that are very particular to the place. In any development of any regional architecture, there's these things that you need to draw on and that really make what we do different from what's happening in Wales.²³

Rural Design distinguishes several principles associated with the landscape they draw on, to do with the weather, which Alan Dickson explains forces a tradition on you:

The buildings here are clipped, they don't overhang, they're tight. If you're walking in the wind, you pull your coat up around your neck and so buildings reflect that, they're not extravagant. They're the opposite of that. They're a tight envelope and a tight skin. And that's what we're trying to do here. So I think these are the traditions that are important to us. In a sense it's not so much trying to look traditional but as trying to take the lessons of tradition and incorporate these. And hopefully that means our buildings will become the new tradition.²⁴

The practice regards the increasing numbers of white houses on the Isles as unsympathetic and non-contextual to the landscape. The designers are more influenced by agricultural sheds, outhouses and barns. Alan acknowledges that these forms are quite original and specific to the locality, but also have an international connection as well.²⁵ Rural Design's architecture is progressive as they look forward and to the past equally. The principles of designing views out to the landscape are instrumental in developing a relationship with the

²³ Rural Design interview

²⁴ Ibid.

²⁵ Ibid.

surroundings, as is creating a connection between inside and outside which is also evident in their works.



Fig. 7.37 Ad hoc additions and outhouses influence the architecture of Rural Design; Fig. 7.38 House built from whatever resources available

In terms of construction, they are interested in the more hands-on architecture that happened in the past, of homes built by occupants from found materials and objects. Alan describes it as 'ad hoc, it's unusual, but it's personal...Croft houses have been extended, maybe six times or more. It's got 12 different kinds of materials, but it's met its function and it's habitable.'²⁶ Materials that are durable and functional are therefore fundamental to their designs. Alan Dickson describes with reference to one of Rural Design's built examples how:

Indulgent materials ultimately feel alien to the landscape. In terms of materiality you can see inside, it's about, what you can see is what you get. The structure of the house is exposed, the bolts are exposed, and there isn't elaboration. And again, I think that's a contextual thing as much as anything, that you have a very honest landscape so the building has to kind of mirror that honesty.²⁷

Honesty of construction as an expression of function is really important to Rural Design as they feel there is no hiding in the particular landscape they work in. They are aware that their buildings will eventually disappear, perhaps technically fail because of the harsh weather. They therefore acknowledge it is 'important for an architect to be aware that you're here just temporarily and custodians of the landscape. You want to leave the landscape in as good a form as you found it.'²⁸



Fig. 7.39 The Black Shed, Skinidin, Dunvegan, Isle of Skye; Fig. 7.40 It takes inspiration from agricultural buildings, timber clad with a corrugated roof; Fig. 7.41 Internally the aesthetic is industrial with polished concrete floors, exposed structure and timber finish for the walls and ceiling

²⁶ Ibid.

²⁷ Ibid.

²⁸ Ibid.

Alan Dickson promotes an ideology of truth to materials. He argues that a timber house should have a timber finish, as opposed to wrapping a timber frame in a solid stone skin. Material should be used where most appropriate and in the nature of the particular material. Projects produced by Rural Design predominately use vertical timber cladding rather than horizontal, this is because timber is much more vulnerable in a horizontal direction and it significantly reduces the life expectancy of the material. The practice believe 'there's a duty as an architect to make a building that's robust and will last as long as possible, even if that's at the expense of your aesthetic ideas,'²⁹ and so that buildings are constructed in an appropriate way.

Form is important to Rural Design's principles, but it is guided by function and their interest in the ad hoc and chaos of forms, as opposed to simplicity. They don't worry about composition and things lining up as they feel 'that's alien to this landscape'³⁰ and aspire for their buildings to reflect the diverse character of the landscape. Alan Dickson explains how he really enjoys that collage quality that they apply to some of their buildings, rejecting the one-size-fits-all rectangular plan, dormers etc.³¹ Their approach to form is honest and direct. Alan describes the how there aren't any rules about how their buildings should look:

The windows don't need to be in any particular order or place, so there's flexibility for the windows to do what they need to do, each window has a particular job. The horizontal window is right behind the sofas so you turn your head, and can see who's walking up the path. The bigger window at the top brings light at a certain time of day, and so on, so, entirely functional.³²

Rural Design does not explicitly adopt principles relating to culture in their design. However they significantly acknowledge that in the highlands it is important to encourage and allow people the opportunity to continue living there and hang on to some of the cultural traditions. It is more about evoking a sense of tradition rather than mimicking it and being sensitive to the situations of a place. Principles surrounding human factors and experiential aspects of design are not as evident in the projects by Rural Design, as practical considerations are prioritised over creating a sense of place.

As recognised above economy, function and spatial arrangement are fundamental to the practice's design principles. These principles have influenced in a number of aspects of design including materials, form and construction. Affordability is considered in the architects' approach to design. However principles of flexibility and repetition are not evident,

Design process

Rural Design's approach as architects is collaborative with the building user, and ultimately the designs reflect that process and dialogue. The site, the client, the architect's interests and

²⁹ Ibid.

³⁰ Ibid.

³¹ Ibid.

³² Ibid.

factors such as budget and time all affect the design. Alan describes how the design process for each project is different as each project varies, but the route to follow is quite methodical.

The site is analysed and detailed surveys utilised so architects working on a project can relate directly with the existing site. There are lots of predictable factors, such as the path of the sun, the view, predominant weather etc. and there are also atypical facts about the client brief, about the architect's mood and time pressures that alter the process.³³

He explains how design can have a methodology to it and a hierarchy but it's more of a "mash-up". The actual point where you conceive a project is usually just a blinding realisation, through doodling and sketching, particularly in quite simple to solve projects. The easy projects go from A to B, and then the difficult projects are all over the place. And sometimes projects are in between all of these. The procedure involved in R House, a prefabricated system of house types fits a more prescriptive pattern as it produces a more repetitive output and decisions made are set and more predictable than in one off projects.³⁴

Different priorities take precedence in the process and some objectives may not be able to be met as compromises have to be made. Some factors may have greater weight than others. Alan states that Rural Design's priority is the landscape, whereas for other architectural practices it may be economics, which may mean they work in a more systematic way. He describes how he probably wouldn't even try to describe their design process as design doesn't necessarily fit into a neat process. Issues occur you can't predict and things don't happen in sequence. It is also difficult to factor in intuition which is vital to design in a systematic process.³⁵

The practice is continually evolving and refining what they do, they don't repeat projects, but every project builds on the last. So their model involves their previous projects. Alan explains that they:

always try and subvert what we've done previously. So, the model is always changing because in a way, the reference that we start with is always different. We don't want to stand still and we want to explore these kind of subtleties more, so our vernacular is the last project that we did rather than the wider landscape and we rarely study the adjacent buildings. We don't often build in a situation where the house is any closer than 100 yards away or something. So, the vernacular for us is just a broad kind of concept. I don't think of white croft houses; I think of people with their coats in the wind.³⁶

Rural Design's approach to design is therefore about investigation and honesty, with each project going through an evolutionary process that feeds into the next. Their concepts drawn from the vernacular are very abstract.

³³ Ibid.

³⁴ Ibid.

³⁵ Ibid.

³⁶ Ibid.

7.2.5 David Lea

Architect David Lea was interviewed as is an influential designer who practices in Wales. He has worked on a number of critically acclaimed buildings projects and has also published commentary on traditions in Wales. Significantly human experiential aspects of design are evident and important in his designs. David Lea was interviewed to find out how his design philosophies are implemented in the way in which he designs, in relation to the model applied in this thesis. The pottery at Cheriton in the Gower was visited to observe how Lea has applied his design theories in practice. The philosophies and design process are compared against the working framework in the research.

Architect David Lea now practices in Wales, having previously gained a reputation for student accommodation at the Royal Agricultural College in Cirencester. In collaboration with architect Pat Borer, David Lea designed the Wales Institute for Sustainable Education (WISE) Building at the Centre for Alternative Technology (CAT) near Machynlleth, Powys. The majority of his works however are on a much smaller scale including The Pottery at Cheriton in the Gower and an extension to Seggar House, a traditional Welsh cottage. Environmental concerns are at the forefront of his practice, he specialises in combining low energy design and materials with sensitive and poetic design.

Design principles

Principles involving landscape and site are fundamental to David Lea's design philosophy. He recognises a relevancy in acknowledging the siting of vernacular dwellings in Wales and observes how most houses are orientated south-west/north-east to capture sunlight after midday and with their gable to windward. The roofs are always pitched to throw the rain off the buildings with small fascias and gutters, which is part of what gives them their character and is 'an essential ingredient of vernacular architecture'³⁷ as David Lea describes. Since the development of glass and advancements in technology, Lea recognises that these design issues have been allowed to be disregarded. However he is still influenced by these principles in design, in addition to providing a connection to the landscape, through framing views.

Materials and construction are also critical to David Lea's principles and he particularly describes importance in the use of local materials in the vernacular, which is much less significant today. He states:

The tradition arises out of materials. And materials arise out of traditional buildings, out of the local economic structure. How much you can afford to pay for stonework. In the poorer areas it was, they used earth instead. And that's where the tradition comes from. And we don't have that. So, to take traditional forms and do it in modern materials to me never looks right, always looks thin, and doesn't have a sort of depth. The materials don't have a depth to them or a roughness or a texture or type of quality.'³⁸

³⁷ David Lea Interview

³⁸ Ibid.

He also maintains that construction has become complex compared to the simplicity of vernacular buildings. He understands timber frames as not particularly simple because of the many layers of materials, vapour control layers, tapes and sealants. The materials have a short life span and are not very durable. 'It's all quite complicated, and if you don't get it right, the building leaks.'³⁹ He describes how he proposed the use of lightweight clay interlocking Zego blocks for a project which was never built as he was fascinated in the principle of the 420mm thick blocks made up of air gaps being of a single material which you can then render. Alternatively the architect is also particularly interested in the use of simple traditional techniques such as straw bale and hemp lime building. These construction systems require a limited number of materials, give a durable finish and provide high levels of insulation. The uses of these techniques however, are not conventional methods of building at present.

David Lea acknowledges the difficulty in developing a vernacular for our time and states that:

the whole basis for vernacular has gone, really. There isn't local production of materials in the way that there used to be which gave you the vernacular expression of each region. And I think the whole argument for a national style has gone as well. So, it leaves you rather out in the cold, doesn't it? Trying to decide what to do. Because you can give any expression to it.⁴⁰

He follows the principle of being ecologically responsible and as direct as possible with materials and the method of building. He believes 'there's also a principle that one should try to show clearly what's going on and not be mystifying.'⁴¹ David Lea's modest architecture appears simple and there is clarity in construction, which is a result of his uncompromising approach in the execution of his buildings and an attention to material and detail. Craftsmanship and making is significant in David Lea's designs and can be particularly observed at the pottery at Cheriton.



Fig. 7.42 Simple form and detailing of materials at the pottery in Cheriton in the Gower; Fig. 7.43 U shaped glass cladding sections used as roof lights to exhibition space and gutters

In terms of form, David Lea draws on the simplicity of vernacular buildings, but has more recently moved away from always designing pitched roofs. This is because of restrictions pitched roofs have on plan forms. Lea promotes the possible use of very low pitched roofs for simplicity and reducing the limiting effect on the plan, as he describes the struggles with the vernacular implications of pitched roofs and trying to make buildings look as if they were built today.⁴² Simplicity is therefore much more crucial to Lea's design principles than form itself. His

³⁹ Ibid.

⁴⁰ Ibid.

⁴¹ Ibid.

⁴² Ibid.

works demonstrate consideration of composition and abstraction of form and maintain modesty and restraint found in the vernacular.

Cultural and human principles are an important aspect of David Lea's design philosophy to create architectural drama, through space relationships and light. He explains 'architecture is really about space more than about construction, because construction is building but architecture is about how it touches you and that's more to do with space and light and qualities.'⁴³ His designs strongly incorporate a sense of place, human scale and the textural qualities of natural materials.

Economy of means is noticeable in David Lea's designs particularly in function and spatial arrangement of form. His designs are modest, but not particularly affordable and don't evidently demonstrate aspects of flexibility or repetition. These more practical principles are less significant than the experiential qualities of space, but are still fundamental to David Lea's works.

Design process

David Lea describes how his process of design following the sequence modern architecture teaches, starting with the brief and site at the same time and looking at what potentials there are. When considering siting in the landscape David Lea believes you should camp there and spend time in various conditions to understand it holistically. He explains:

I always try and start with the site and try and intensify the drama of the site as much as possible. Make it a surprise element, discoveries of views or spaces which you don't immediately see or expect when you first see it. And orientation, sunlight is very important. I try to get the spaces to work properly and then I start thinking about construction, what it's made of.⁴⁴



Fig. 7.44 Pottery at Cheriton, the Gower; Fig. 7.45 David Lea positions the arrival and entrance so that the river running next to the site is unnoticed until inside the exhibition space of the pottery; Fig. 7.46 In the exhibition space reflections of the river and the shadows of the trees can be seen on the ceiling

However he articulates that this is not the only way to design, but adds that it would be interesting to reverse that and start with the materials. He describes the importance of original concepts expressed in the final result as clearly as possible, because if you don't have clear intentions the outcome is going to be confused and indistinct. It's therefore important to decide on initial concepts and what intentions are for everything from the outset.

⁴³ Ibid.

⁴⁴ Ibid.

7.2.6 Glenn Murcutt Master Class

The Glenn Murcutt International Master Class is an annual workshop, which takes place at 'Riversdale', Australia. In 2011, the Irish European Master Class was the first to be held outside the country by the Architecture Foundation Australia. The locality of the master class in Glenree, County Wicklow in Ireland, gave the opportunity participate on the one week residential studio based programme for professional architects and designers. The aim of the master classes is to present 'place based immersive programmes with eminent tutors in significant locations'.⁴⁵ The master class in Ireland was led by world renowned architects Richard Leplastrier, Peter Stutchbury and Juhani Pallasmaa. It gave the opportunity to identify their philosophies and approaches to design of and apply some of their principles in practice in a short design study. The intensive one week design studio programme involved a design charrette undertaken in groups, with ongoing tuition and culminating in a design presentation critiqued by the distinguished tutors. A development and understanding of the particular landscape was encouraged by the tutors, both practically and poetically. Their teaching was implemented in the design of a dwelling and workshop for an artisan.

Site analysis

Analysis of a specific site at Glenree in Ireland involved an engagement with the site not simply as an area of ground, but as a place where numerous processes including sun, wind, water in air and from the ground, vegetation and other living things come together. An appreciation of changes through day and night of the site and shifts in different seasons and weather patterns was considered with respect to the short period of time spent studying the place, as the site exists not only in space but also in time. Physical specifics affecting the site such as sun angles, orientation, directions and habits of the wind and rain, the make up of the soil and trees that grow on it were observed. Peter Stutchbury explains 'A study in detail of the composition of our landscape reveals the repetitive patterns and marks of sand, stone, native grass and trees. There is an overall strength and beauty in the way those elements repeat and change in direct response to the composition to the climatic and geological conditions. The landscape can be traced and interpreted through its patterns.'⁴⁶ He describes the ground as a register that reflects activity and type. 'It can indicate geology through plant type, even land fertility. Topography talks water flow and ground configurations that reveal lines in the land that are sacred and should be respected.'⁴⁷

Understanding of culture of place was developed through observing what had been done before. The tutors particularly encouraged to consideration of phenomenological analysis of landscape. Juhani Pallasmaa states that the 'character of a space or place is not merely a

⁴⁵ Architecture Foundation Australia <<http://www.ozetecture.org/masterclass/>> [accessed 27 September 2013]

⁴⁶ Peter Stutchbury, *Under The Edge: The Architecture of Peter Stutchbury* (Brooklyn, NSW: Architecture Foundation Australia, 2011), p.18.

⁴⁷ *Ibid.*, p.20.

visual quality as is usually assumed. The judgement of environmental character is a complex fusion of countless factors which are immediately and synthetically grasped as an overall atmosphere, feeling, mood or ambience.⁴⁸ He explains 'Paradoxically, we grasp the atmosphere of a place before we identify its details or understand it intellectually. In fact, we may be completely unable to say anything meaningful of the characteristics of a situation, yet have a firm image, emotive attitude, and recall of it.'⁴⁹

A whole day was spent on the site, experiencing it and drawing it. The participants were encouraged to observe the landscape in plan as well as elevation, without the use of equipment but through our human bodily interaction with it. Peter Stutchbury regards 'One can become accustomed to reading the landscape; the patterns that allow us to translate history, composition change and context. The land comes alive with clues and explanations, rarely does clarity not exist, we only need to look, wonder and find.'⁵⁰

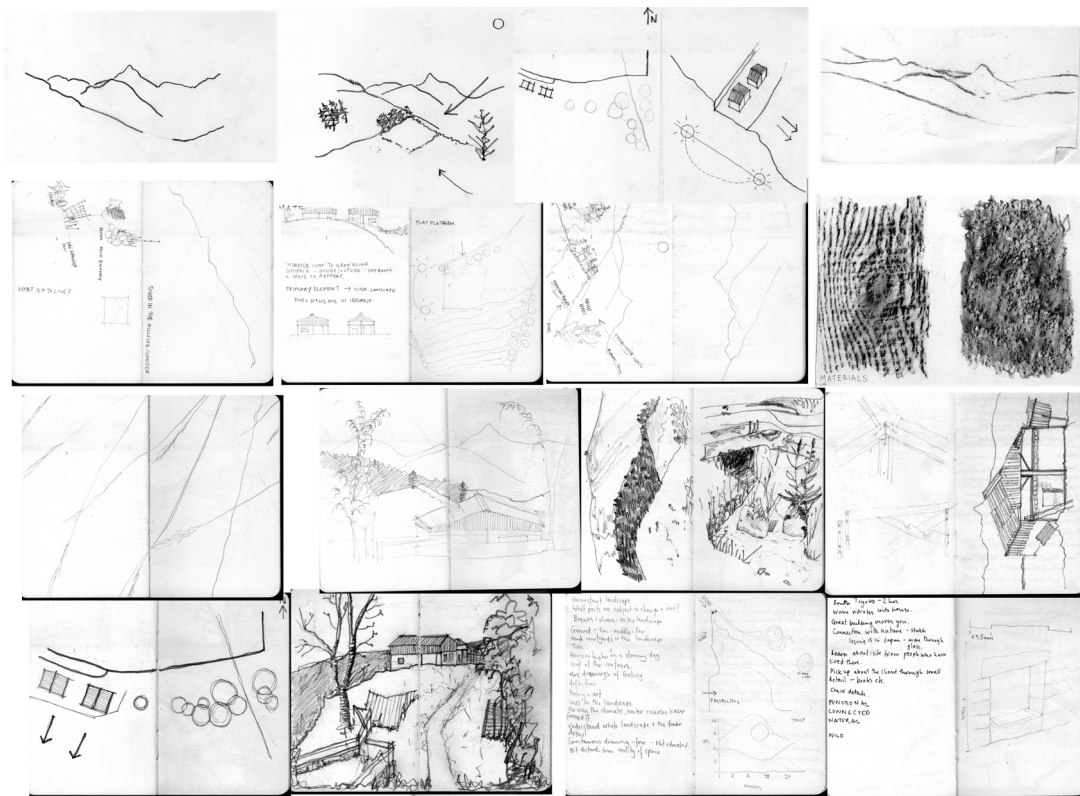


Fig. 7.47 Site analysis and study on site in a sketchbook

Design charrette

The design charrette was undertaken in small groups. The brief for the group project was to design a dwelling and workshop for a musical instrument maker, with a display area and small performance space. The primary concept was for a deep inhabited wall with spaces carved

⁴⁸ Juhani Pallasmaa, 'Place, Atmosphere and Architecture: perception, memory and imagination', (unpublished paper, Copenhagen Business School, 2011), p.1.

⁴⁹ Ibid., p.2.

⁵⁰ Peter Stutchbury, p.18.

out of it that open out to the south and the direction of principle views. A series of niches within the wall form the spaces, with smaller niches within these spaces. Places defined within the wall relate in scale to the functions within. The more private end of the wall, where the dwelling is accommodated is more intimate in scale compared to the more open and larger scale spaces that house the workshop, display and performance areas.

The route and approach to the building is built up to progressively to reveal the landscape and the primary view out across the valley. The form and landscaping engages with the topography of the site and retains and makes use of the existing landscape features and those formed by humans. The design is responsive to the environmental context and climate in terms of the form and technology. The wall retains heat from the sun through thermal mass and captures solar gains through extensive glazing on the south facade.

The design addresses and is responsive to the landscape from both a practical and an experiential respect and attempts to draw on the teachings of Richard Leplastrier, Peter Stutchbury and Juhani Pallasmaa.

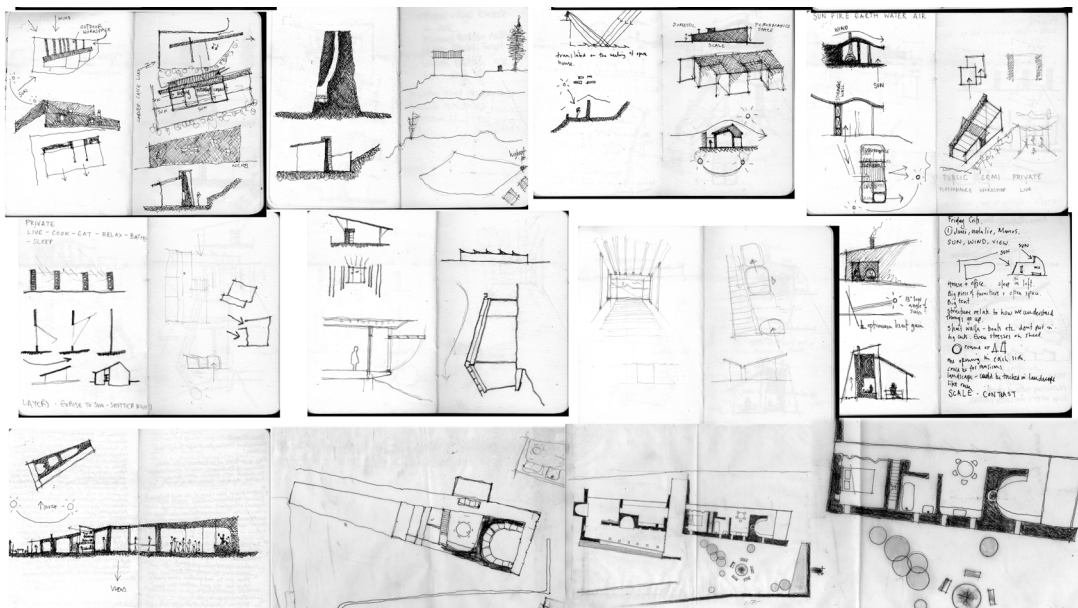


Fig. 7.48 Initial design study sketch ideas

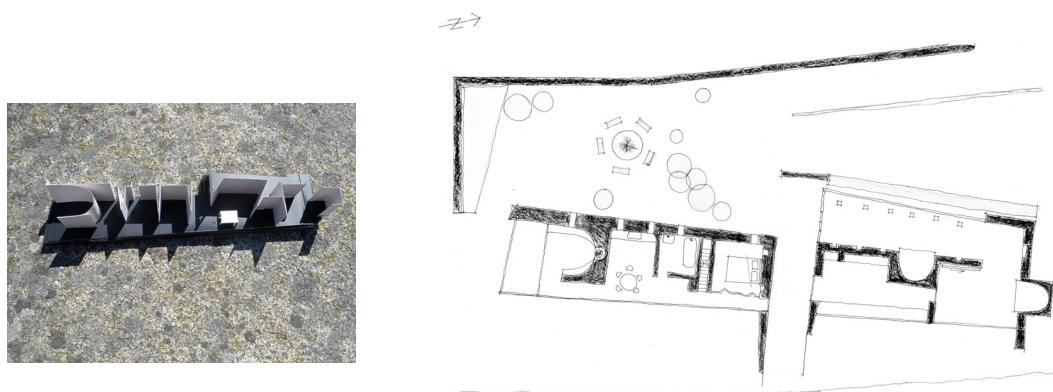


Fig. 7.49 Sketch model; Fig. 7.50 Plan of dwelling and workshop showing places to inhabit and directed views out to the landscape

7.2.7 Summary

The architects studied in this chapter, including Dualchas Architects, Rural Design, David Lea and the architects involved in the Glenn Murcutt Master Class reveal different and particular ways of working, based on a common objective for their buildings to fit in the context of place, both physically and to a lesser extent culturally. The designers all show an attention to detail in understanding the context and siting of buildings in the landscape. They aim to realise designs that are sensitive to the landscape, climatically suitable and culturally appropriate. Dualchas Architects, Rural Design and David Lea all base their architecture on the vernacular of the settings they design within. Dualchas Architects draw on the blackhouse of the highlands, Rural Design on the ad hoc agricultural sheds of the same region constructed of wood, stone and rusty metal and David Lea on the traditional farmhouses and cottages in Wales. The practices reinterpret different principles from these indigenous forms in addition to being influenced by traditions of siting in their design. David Lea and Juhani Pallasmaa hold a similar interest in understanding and emphasising experiential feelings of place in design – the poetic as well as practical issues of climate. David Lea is concerned with creating a sense of place through differing qualities of space, light and material textures. Juhani Pallasmaa acknowledges the ambience of place beyond the visual.

A number of the designers discussed have shown a connection with the modest, simplicity of vernacular buildings through a lack of excess, a reduced palette of materials and colour, minimal detailing and simplicity of construction in contemporary designs. Dualchas Architects produce a reductive architecture of simple and modest forms in the landscape, geometrically composed and stripped of detailing. Dorian Bowen's approach to the extension at Bryncyn is similarly rooted in simplicity and restraint, however the concepts are driven further and the new form possesses simplicity in the construction as well as the aesthetic, which is not realised to the same level in the projects by Dualchas. The construction materials are driven to their structural limit in the minimalist extension to create purity in the contemporary addition in parallel with the simplicity of the adjoining traditional cottage. David Lea maintains a similar direct approach to the use of materials and considers construction should be clear, straightforward and simple. These ideals are also carried out in the modest form and aesthetic of his buildings. Rural design applies an alternative reasoning to the creation of form in their designs. They similarly display an attitude towards revealing the true nature of construction. Forms are not composed with consideration of aesthetic values, but are a particular response to a brief and site, drawing on the additive and haphazard nature of outbuildings and 'lean-to' structures. 'The practice makes the point that whereas Dualchas's work may be described as 'minimal' they like to think of their own work as 'minimum'. In this comparison 'minimum' would include all matters such as real 'economy of effort' as well as cost, but also philosophical stance to 'show it as it is' without unnecessary adornment'.⁵¹ All the designers considered here demonstrate an economy of means in their approach to design in various ways.

⁵¹ Mark Walker, 'Examining the roots of contemporary Scottish experience in designing modern housing in 'traditional' rural contexts', *Architectural Review Quarterly*, 16.4 (2012), 286-300 (p.295).

Evidence of the designers' philosophies and work being critical to or influenced by principles in the operational framework in this thesis are analysed and tabulated in the chart below. This is to establish the most influential principles to the works of the designers, in relation to the research.

	Dorian Bowen - Bryn cyn	Dualchas Architects	Rural Design	David Lea	Master class Peter Stutchbury Richard Lepelstrier Juhani Pallasmaa
Site	N/A	■	■	■	■
Landscape	N/A	■	■	■	■
Orientation	N/A	■	■	■	■
Climate	N/A	■	■	■	■
Ecology	N/A	■	■	■	■
Topography	N/A	■	■	■	■
Views	N/A	■	■	■	■
Inside/ outside	■	■	■	■	■
Construction	■	■	■	■	■
Materials	■	■	■	■	■
Resources	■	■	■	■	■
Sustainability	■	■	■	■	■
Technology	■	■	■	■	■
Locality	■	■	■	■	■
Craftsmanship	■	■	■	■	■
Form	■	■	■	■	■
Simplicity	■	■	■	■	■
Abstraction	■	■	■	■	■
Composition	■	■	■	■	■
Modest	■	■	■	■	■
Identity	■	■	■	■	■
Creativity	■	■	■	■	■
Culture	■	■	■	■	■
Human	■	■	■	■	■
Community	■	■	■	■	■
Family	■	■	■	■	■
Sense of place	■	■	■	■	■
Experiential	■	■	■	■	■
Texture	■	■	■	■	■
Light	■	■	■	■	■
Economy	■	■	■	■	■
Function	■	■	■	■	■
Spatial Arrangement	■	■	■	■	■
Flexibility	■	■	■	■	■
Repetition	■	■	■	■	■
Affordable	■	■	■	■	■

■ Fundamental
 ■ Evident but not critical
 ■ Not evident

Fig. 7.51 Chart showing the degree of influence principles from the operational framework have on the architects' works

The chart demonstrates that principles surrounding site and climate are most fundamental to the theories and practice of the architects analysed. These principles are not applicable to the work of Dorian Bowen as the design at Bryncyn is a restoration project. Construction and materials also emerge to be fundamental to the works of the architects interviewed, with some importance in resources, technology and sustainability of their projects. The importance of form in its various applications is approached in a much wider and open way, depending on the different architectural positions of the designers. In terms of culture and human factors, it is illustrated in the chart that these issues are much less prominent or evident in the work of the designers. Community engagement is not evident, partly because of the nature of the works being individual rural projects. Significant to the research are the beliefs and practices of David Lea and the architects involved in the Glenn Murcutt Master Class including Peter Stutchbury, Richard Leplastrier and Juhani Pallasmaa in particular. This is in regard to their conviction in the importance of experiential qualities in architecture, including light, texture and sense of place. These ideas are less evident in the other designers' work, where the objective is more important. The designers all show pragmatism in function and spatial arrangement and to some extent economy of means. They do not however demonstrate affordable means of designing. The nature of the projects discussed also, don't particularly show flexibility or repetition, as the schemes are mostly one off isolated buildings.

This chart is therefore useful as it demonstrates how the architects and designers primarily focus on the objective in their works, fundamentally involving site, materials, construction and function. The designers were selected for analysis because they draw on tradition in their works, however cultural and human aspects of tradition are not very strong in practice. The works of David Lea and theories of Juhani Pallasmaa are much more influenced by the subjective and will be fundamental to the model and an important focus for the following design study. The depth of study of place demonstrated by all the architects and particularly the lessons learnt on the master class will also be addressed in the final design study.

The methods by which the interviewed practitioners work, supports previous research in this thesis that suggests that the process of design doesn't necessarily follow a systematic route, but there are some constants that help give direction. At the same time the process is different in every situation and contains different degrees of complexity. The study emphasises how design is influenced by multiple factors including site, client/brief and significantly the designer. The interviews reveal the designers' strong architectural positions and their determination and conviction in carrying out their principles in design without compromise. Dorian Bowen and David Lea particularly recognise the importance of outlining the design intent in detail from the outset, so original concepts are not lost in the design development.

7.3 Design approach and principles

7.3.1 The demise of the pyramid

It was demonstrated in the foundation studies that establishing a hierarchy of needs to determine principles as a basis for the model proved an unsatisfactory method in which to design. The architects and designers examined in this chapter verify that it is not a natural approach to design to follow this method. The foundation studies also highlight the difficulty in ordering and giving degrees of importance to principles as the hierarchy of needs alters for various people, situations and time, despite some elements of tradition appearing to be more significant than others. Lang describes how there is 'tremendous human variability in what is important and what is not... Many seemingly irrational needs are important and thinking them as unnecessary and "devoid of justification" is short sighted. For many people the fulfilment of spiritual ends, that to others are irrational, is of high importance.'⁵² In Maslow's hierarchy of needs, personal factors towards the top of the triangle, in hindsight appear to be just as important as the functional needs at the base of the triangle. The findings of the foundation studies show that these human motivational factors should be addressed in design. 'Self-actualisation' as Maslow maintains increases satisfaction and happiness and it is this application by occupants which gives a place character and meaning.⁵³ These matters form more pleasurable and experiential aspects of dwelling and are developed through creativity. In the foundation design studies the principles established from the most fundamental needs tended to be practical and physical as opposed to personal, subjective and experiential. Today it remains necessary to meet the essential needs of the occupant in design, however it is now much easier to achieve this through improved technologies, allowing less critical needs towards 'self actualisation' to hold greater significance.

It was therefore decided to abandon the application of the hierarchy of needs in the form of the triangle and modify the model to address elements of vernacular design more holistically. The framework below is revised in light of this.

7.3.2 Model for design

Following interviews and fieldwork with designers who have produced exemplar architecture, recognised in literature, journal publications and by experience and visits by the author, the model for design is reviewed and reconstructed. The interviews and fieldwork illustrated the great range of influences from tradition affecting design and the way in which they are integrated, confirming findings developed in the foundation studies. The framework is then revised in light of this below.

⁵² Jon Lang, 'The 'New' Functionalism and Architectural Theory' in *Culture, Meaning, Architecture: Critical Reflections on the Work of Amos Rapoport*, ed., by Keith Diaz Moore (Aldershot: Ashgate Publishing Ltd., 2000), pp.77-99. (p.91).

⁵³ Abraham H. Maslow, *Toward a Psychology of Being* (New York: Van Nostrand Reinhold, 1968), p.31.

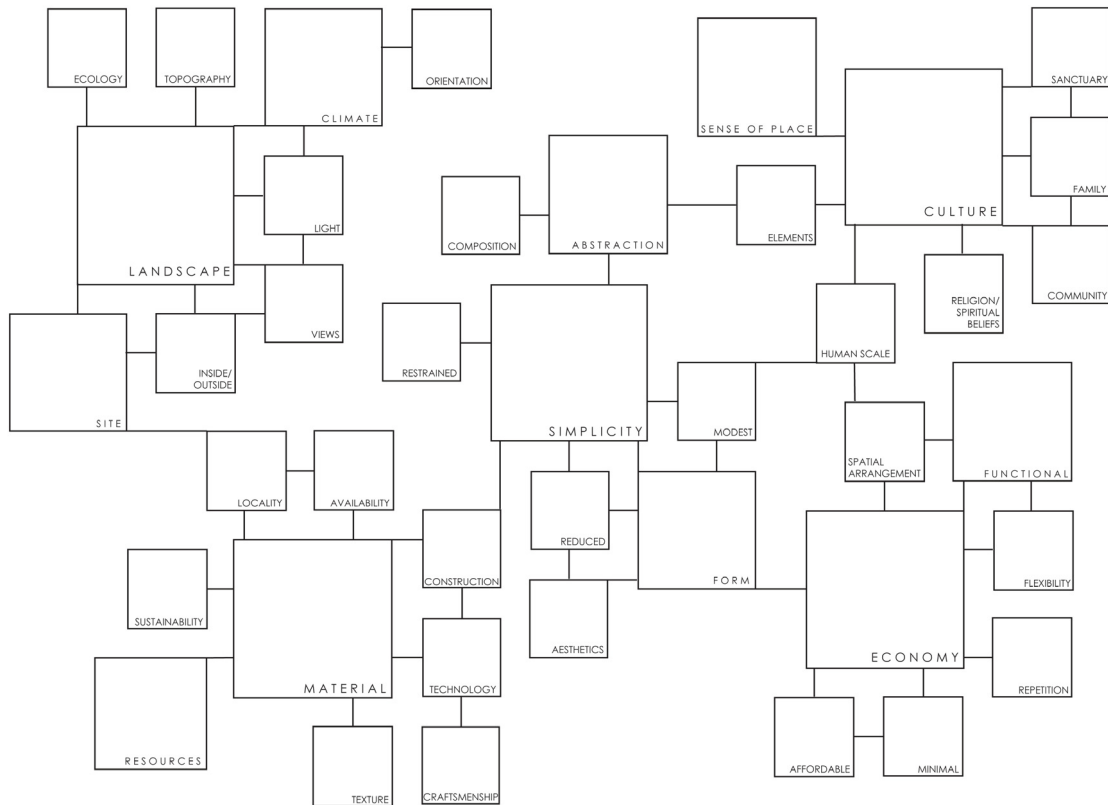


Fig. 7.52 Development of model showing principles all interconnected and related to one another, with some aspects taking precedence over others in guiding the design

Despite the ideas and works of the designers demonstrating focus on particular aspects of design, it recognised that it is fundamental to address all aspects to a certain degree, in particularly cultural, human and experiential characteristics of tradition, which are most noticeably least employed. Therefore a more holistic approach to utilising principles from tradition is necessary, which is demonstrated in the model. However a development of how key principles will be addressed in design still remains to be determined as the model in this state still does not provide a direction in which the principles will be taken. The study of best practice also confirmed the importance of individual designers' viewpoints and architectural positions and how these affect all aspects of design, but most significantly form. The operational framework above is restructured below and the principles organised into five main principles to test in the final design.

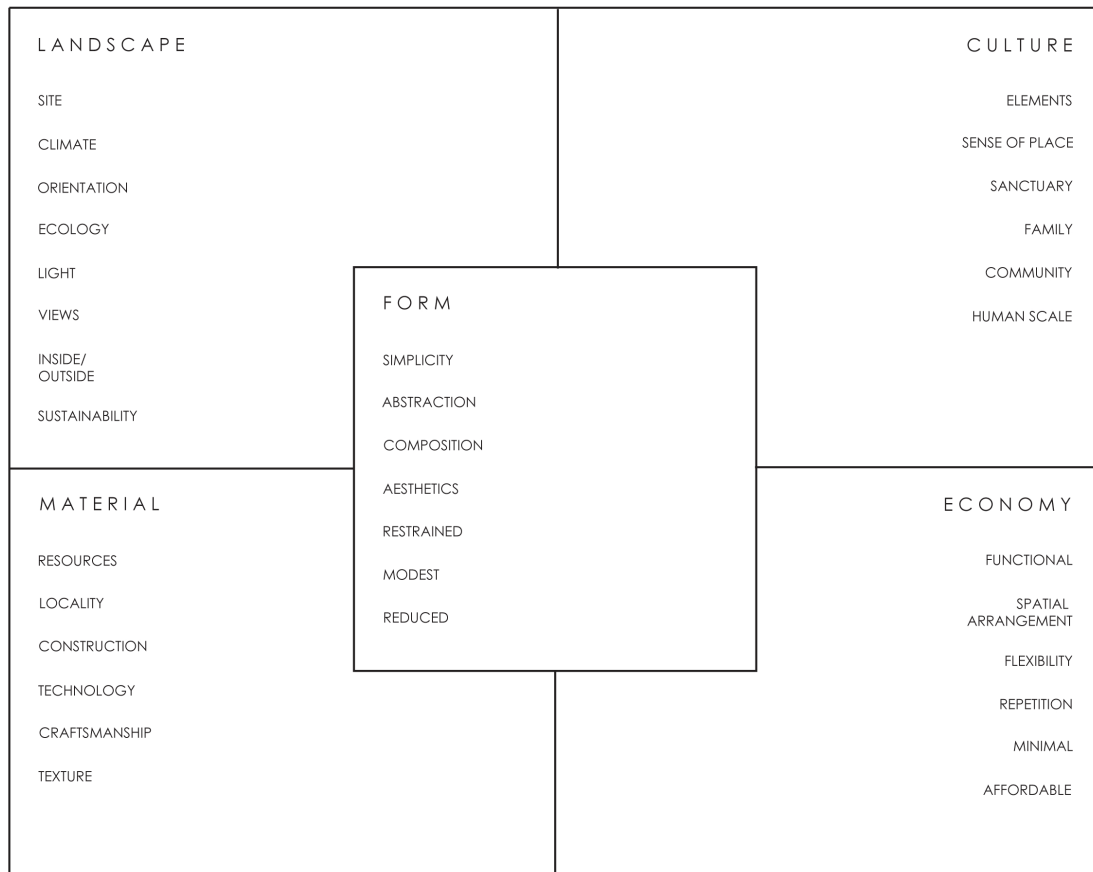


Fig. 7.53 Model structured in the five main principles of design

7.3.3 Design approach to model

As a result of discussions regarding the process in which architects and designers interviewed carry out their design work, it became apparent that they all hold strong yet differing architectural positions and philosophies that they strictly follow and develop in design. These architectural stances are held from initial phases of design and are experimented with, yet maintained through the process and are evident in the final built outcomes. Within the main principles of design determined from the model above a detailed analysis of the attitude towards each principle will be established before the final design is undertaken, for the author to develop their architectural perspective on design. Principles are determined from the model for design and are listed below. These are then discussed in detail to establish how the principles will be applied and used to inform the final design study.

7.3.4 Principles

- Sensitivity to and connection with the landscape and site
- Simplicity of form and construction
- Materials chosen for practicality, availability, locality, sustainability and aesthetics
- Cultural elements of the building tradition
- Economy of means

7.3.5 Sensitivity to and connection with the landscape and site



Sensitivity to and connection with the landscape and climate involves buildings being appropriate to place, rooted in the cultural and regional land in which they belong. It necessitates both physical and cultural association with place and its people and an understanding of social and political circumstances of a region.

It has been continuously reiterated in this thesis, that it is relevant to analyse the vernacular of a place to gain an understanding of the fundamental character of a locality. As described by Dominic Stevens and others we can learn from the relationship of vernacular buildings to their surroundings beyond the physical boundary of a site. This is because traditional form has been shaped through understanding of the site and knowledge passed down through communities.⁵⁴ Similarly David Lea explains the importance of gaining knowledge of the land, which can influence the siting of buildings. He states:

the siting of a house in open countryside is not easy; it requires time to understand the climate and seasons. Who has not noticed, when travelling through a valley in shadow in the wintertime, or as the sun is setting early behind the hills, that there is one place where light still lingers, and there stands a house?... most houses in the countryside turned there backs, or at least their shoulders to the wind.⁵⁵

The way in which vernacular dwellings are sited in the countryside can inform methods in which new buildings utilise the landscape to provide protection from the elements and adopt passive design strategies as a response to climatic conditions of a place. This can be developed through observation and understanding of the nature of a site and its wider cultural context, including topography, ecology, light and climate, in order for buildings to be responsive to environmental issues through passive means.

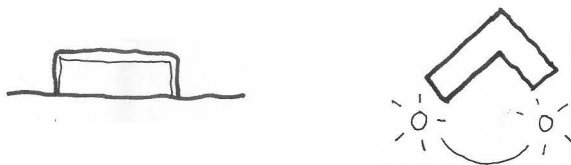


Fig. 7.54 Wrap up warm; Fig. 7.55 Face the sun

Improved construction systems with well insulated envelopes and efficient glazing have meant that the importance of these principles has diminished today. However this thesis argues that there is still a relevancy in applying these principles to design for environmental benefits,

⁵⁴ Dominic Stevens, *Rural: Open to all, beginners welcome* (Ireland: Mermaid Turbulence, 2007), p.32.

⁵⁵ David Lea, 'Fake or Real?', *Planet: The Welsh Internationalist*, 138 (1999/2000), P.78.

human pleasure and comfort – ‘the joy of the sun’⁵⁶. As buildings are more efficient, there is an opportunity for form to be less dominated by physical environmental factors and allow other aspects of design, such as views out to the landscape to take precedence, as they hold a greater relevancy on design today.

The surrounding setting beyond the immediate territory of a site should be considered and building form and landscape recognised together, as David Leatherbarrow reiterates ‘site should “structure” the project’.⁵⁷ Reading and understanding the wider landscape enables identification of significant moments of change in the landscape and markers of a place. This can relate to historic, climatic, geographical or human interventions with place.

Building form should be grounded in its surroundings, with an interrelationship between inside and outside. Internal space can be connected to the wider landscape in the creation of specific places which evoke a particular ambience and atmosphere. This could involve diverse qualities and quantities of light entering a space at different times of the day, through the seasons or in views out framing features of the surrounding landscape. The connection and relationship with the landscape is enhanced and intensified through these methods to create meaning and a sense of place. As highlighted by David Leatherbarrow, ‘site—or, more broadly, ambient landscape—is not what surrounds and supplements the building, but what enters into, continues through, emanates from, and enlivens it’.⁵⁸ This phenomenological and experiential connection with place is critical to the works of David Lea and Juhani Pallasmaa.

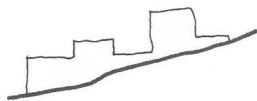


Fig. 7.56 Form rooted to the ground; Fig. 7.57 Bryncyn sited in a hallow in the landscape; Fig. 7.58 Immediate territory of Llainfadyn

As Dominic Stevens observes:

If we learn from our past and from species around us and add to this our contemporary technical no-how and our intellectual cleverness as a species we can once more make houses that are a balanced part of the landscape in which they are sited as opposed to being hosted by the landscape.⁵⁹

⁵⁶ Mary Arnold-Forster, ‘Highlanders have long travelled’ in *Architecture in Scotland 2006-2008: Building Biographies* (Glasgow: Lighthouse, 2008), p.153.

⁵⁷ David Leatherbarrow, *Topographical Stories: Studies in Landscape and Architecture* (Philadelphia, Pennsylvania: University of Pennsylvania Press, 2004), p.21.

⁵⁸ *Ibid.*, p.21.

⁵⁹ Stevens, p.32.

The thesis highlights that although it remains critical to address climatic conditions of site in order to improve efficiency of built form environmentally, improved materials and construction systems has meant it is no longer necessary for form and siting to be determined by climate, orientation and topography. Without constraints determined by climate dictating design, greater prominence can be given to placemaking in relation to context through natural lighting variations and ambience, connection and views out into the landscape.

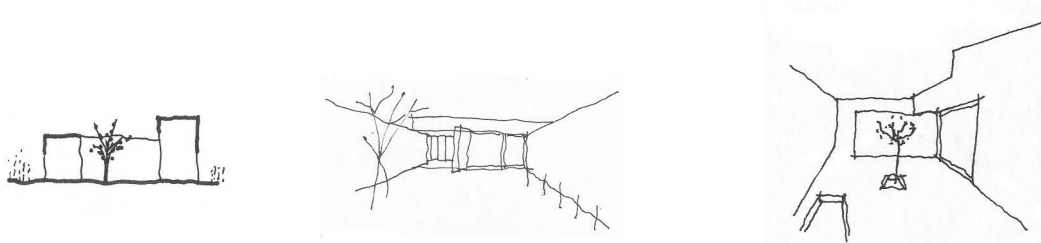


Fig. 7.59 Interrelationship between inside and outside; Fig. 7.60 Outside room; Fig. 7.61 Building frames immediate landscape

In addition to physical environmental aspects of the landscape being significant to the study, social factors of how people inhabit space in relation to the wider landscape and community should be acknowledged. This is so places are considered within the context they are formed to feel part of a distinct place and are tied to the grain of the place.

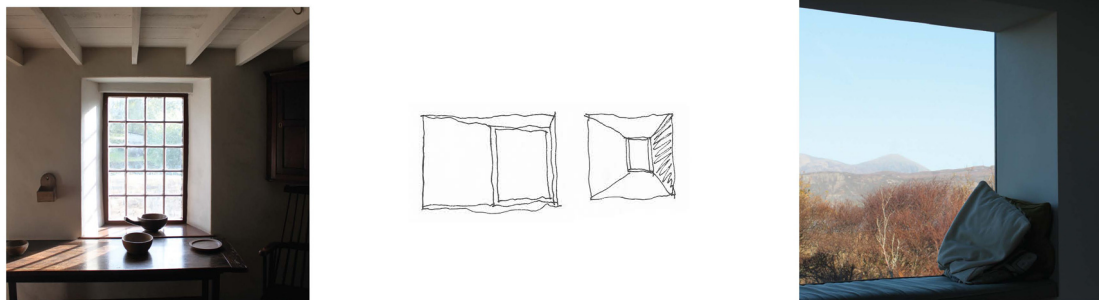


Fig. 7.62 Quality of light entering the dwelling at Rhydycar; Fig. 7.63 Splayed window openings; Fig. 7.64 Place to inhabit with a view to out to makers of the landscape at The Shed designed by Dualchas

7.3.6 Simplicity of form and construction



Simplicity of form and construction involves simple design abstracted from traditional dwellings and agricultural forms. However, in order to create a simple, reduced form with minimal aesthetics, construction can often become complicated. This principle aims for construction to be carried out in a straightforward manner and continue to be made simply in the sense of traditional methods, but using modern techniques. The objective is for production of simple design, construction and reduced details, with focus on the building essentials, whilst creating an overall restrained and modest, composition and aesthetic.

Traditional dwellings were built of simple form, and construction was direct and straightforward as materials and skills in building were limited. Form was minimal, modest and built of rational geometries, rectangular in form, primarily for practical reasons so spaces could be subdivided, extended and arranged in settlements. The basic elements of the house were devoid of adornment and elements were repeated where possible.

Traditionally resources obtainable nearby the site for a dwelling determined the composition of its structure. The way in which materials were assembled was in respect to inherent properties and for ease of construction. Large stones were used at the base of cottages and farmhouses forming a plinth, with gradually smaller stones placed higher up the wall where they could be handled more easily. A contrast of massive stones at the foundations and small slates at the ridge creates a subtle variation to the simply form and an illusion of scale. Long lengths of stone were often used if available to increase stability, creating a horizontal aesthetic. The vernacular builders adhered to the nature and properties of materials they used and expressed them truthfully. Heavy stone walls utilised the materials compressive strength and openings reveal the thickness of load bearing walls. Materials were put together in a rational manner depending on their specific size and shape.

Traditional buildings are usually easy to interpret and the construction is expressed and readable. Materials are recognisable as they are left in their raw state. As construction is not multi-layered, the way in which buildings are put together can be understood. The limited use of different materials means there is simplicity in detailing and the manner of building is direct and rational.

Simplicity of form was conceived as a result of simple construction techniques. There was also influence from religious practice. Christianity has played an important role in Welsh history and

in shaping Welsh communities and its buildings. The subdued and conservative style of humble non-conformist chapels influenced the plain, unadorned simplicity of many Welsh cottages. As it has been recognised in the thesis, many of the vernacular dwellers did gradually apply decoration to their abodes. Christian Schittich argues that building simply 'does not necessarily have to mean doing without all ornamentation, as demonstrated by the lovingly decorated old farmhouses, which are firmly rooted in their surroundings and whose ornamentation was usually derived from practical purpose.'⁶⁰ Decoration took time to craft and was a luxury to symbolise something special. Even the most simplistic cottages show signs of restrained ornamentation to specific elements to give identity and individual meaning for people.

Monolithic and homogenous materials

The solid and protective wall of stone cottages and farm buildings form an enduring interface disconnecting the interior from the exterior, as opening sizes are limited due to openings weakening the load-bearing behaviour of the monolithic walls. The homogenous structure embodies functions of separating, supporting, insulating, protecting and even storing thermal energy. It regulates humidity in the interior and achieves a balanced internal climate. Monolithic form gives building a sculptural or cast appearance, layered horizontally. The massiveness of stone gives the sense that the form is deeply rooted to the ground and of the land. It conveys a feeling of stability, permanence and durability. In comparison to double-leaf wall construction consisting of highly specialised but mono-functional components, the multiple functions of a homogenous structure appears to remain relevant to contemporary construction in building simply.

Application of building simply today

In an attempt to employ the concept of building simply from tradition in contemporary design it has become apparent that the added complexity of building today has made it a difficult task. Building has become more complex because of a need to meet increasingly demanding environmental targets. As a result new buildings tend to be made up of multiple layers of materials all performing different tasks to provide protection from the elements and a comfortable internal environment. Some materials are 'there only to compensate for the deficiency in an adjoining material.'⁶¹ In comparison the walls of traditional dwelling in Wales were made up of principally a single mass of material and it was simply the thickness of the wall that dictated the environment within the home.

Christian Schittich argues 'building simply' means in the sense of the traditional ways of building, through economic use of local resources, rather than merely seeking a visually

⁶⁰ Christian Schittich, 'Building Simply' in *Building Simply*, ed. by Christian Schittich (Basel: Birkhauser, 2005), p.9.

⁶¹ Gordon Murray, 'The difficult art of the simple', *Architectural Review Quarterly*, 11.2 (2007), 112-117 (pp.115-6).

reduced aesthetic. He states in *Building Simply*: 'The formal simplicity resulting from aesthetic endeavours is rarely also really simple in a technical or economic sense, however. The perfectly reduced form can often only be attained with greater effort. This effort can manifest itself in more extensive design work, but also in an enormous amount of work on hidden details, as is often found beneath the smooth outer surface of a multi-layered wall construction.'⁶² The readability and structural honesty of traditional dwellings came from a logic which informed the simplicity and this should be attempted to be continued today.

The ideology of designing 'in the nature of materials' is exemplified in works of twentieth century architect Louis Kahn. Kahn expressed the method of construction poetically in his buildings and in particular the moments of intersection between materials. He advised architects 'to draw as we build, from the bottom up... to make a mark at the joints of pouring or erecting.'⁶³ This position to express the truth of material and structure has become harder to accomplish in more recent times as thermal continuity is required throughout the building envelope, resulting in interrupted structural logic.

In order to achieve thermal efficiency it has meant that construction today is commonly made up of several distinct layers. The performance of each individual layer is optimised according to its function. The thickness of construction is reduced as the performance of each specialised component is maximised. The outer surface of the wall is a protective cladding for the insulating and load-bearing layers within. The wall is made up of interdependent, mono-functional layers. The construction has an increased degree of complexity fulfilling all the material properties of traditional homogenous structures, but resolved into its parts to form a much higher performing building envelope.

The current practice of wrapping a structure in a continuous layer of insulation and cladding it in a rainscreen is closer to Semper's philosophy. He insists that 'the "truth" of a building did not reside in its construction (core-form), but in an appropriate surface dressing (art-form). The "true" wall is what we see, not the inner construction we can not see.'⁶⁴ This seemingly logical approach to building in our times however lacks structural clarity of building evident in traditional forms. Without continuity of structure and an understanding of how a building is constructed, it becomes meaningless and simply a shell.

Building simply is therefore harder to achieve because it is contrary to the idea of 'layered' construction and ubiquitous materials and detailing. Florian Musso in *Building Simply* however regards that 'it is usually senseless to take on the forms of historically developed building types without questioning their rationale. A poorly understood copy of old buildings, without clarification as to the living styles and construction forms of the present, destroys the spirit of this

⁶² Christian Schittich, 'Building Simply' in *Building Simply*, ed. by Christian Schittich (Basel: Birkhauser, 2005), p.9.

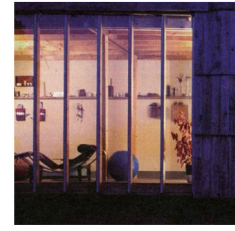
⁶³ Richard Saul Wurman, *What Will Be Has Always Been: The Words of Louis I. Kahn* (New York: Rizzoli, 1986), p.125.

⁶⁴ Richard Weston, *Material, Form and Architecture* (London: Laurence King, 2003), p.62.

architecture.' In its place 'a well understood interpretation of values and of the method that forms the foundation of these architectural styles allows for a procedure that is related to the context and has direct reference to the cultural basis.'⁶⁵ With specialist processes and factory made elements the need to build by the simplest means is lost and not necessarily an economical solution for design today. It is therefore more in the hands of the architect to achieve, as opposed to being derived from a 'learnt' way of doing things and minimal trades. It is not a necessity anymore, but an ambition to achieve structural clarity. This principle therefore aims to apply the tradition of designing and building in a simple and straightforward manner in contemporary practice to retain simplicity and continuity of form present in vernacular buildings.

⁶⁵ Florian Musso, 'Simply Good' in *Building Simply*, ed. by Christian Schittich (Basel: Birkhauser, 2005), pp.10-25 (p.16).

7.3.7 Materials chosen for practicality, availability, locality and aesthetics



The aim of this principle is for material to be selected for their suitability and expression. This includes that they should be chosen to fulfil their function and be durable to withstand site conditions and building usages. Materials should be easily obtainable and be able to be purchased as locally as possible, and originally sourced and processed within as close proximity to the site as applicable. They should be able to be handled by local builders, without the need to bring in specialists from afar. For sustainable reasons natural materials should be used where possible. Natural resources maintain a direct connection with the landscape through their textural qualities. An awareness of the wearing of materials is an important consideration. This includes how they weather and age over time. Materials should also be chosen for their expression and exterior quality, in relation to the context in which they will be used. This range of issues should be addressed; however there will be greater focus on some matters over others, depending on their application and usage in the building and the specifics of the project brief.

Landscape, place, identity

Traditionally buildings were constructed from materials found and collected in the vicinity of the site and built by local people. Buildings were specific to their place through the materials used and the close relationship to climate and landscape. Materials available to a place dictated the design and structure of buildings. Differences in building traditions and customs developed in areas depending on the resources available to a particular place. This has given rise to buildings of a region acquiring a strong local character and identity. The traditional forms possess a sense of belonging and timelessness in their setting, through the use of materials and their siting. Knowledge gained over time of the landscape, climate and local resources was utilised in constructing dwellings efficiently and economically. Forms, textures and colours intrinsic to a specific place have evolved from resources available. The building customs are rooted in practicality.

However as recognised in this thesis, there was often a degree of choice of materials, construction and plan form, which is not always appreciated. There were also trends as to which materials were commonly used at various times, partly to do with skills of craftsmen. As Richard Suggett suggests dwellings that have survived are predominantly made of stone or

were built of a hybrid of stone and timber,⁶⁶ demonstrating the durability of stone over other building materials.

Texture, colour, weathering

The visually simple form and plain space of traditional buildings evokes awareness and appreciation of the experiential qualities of a space and intensifies the textural qualities of materials. Juhani Pallasmaa discusses the relationship between simple building and a sense of materiality and promotes the use of natural materials that allow the gaze to penetrate their surfaces and reveal the truthfulness of material. He argues that the familiar materials of most contemporary architecture – sheets of glass, enamelled metal and synthetic materials don't present anything of their material essence of age.⁶⁷

Aesthetic values of the vernacular come from the materials and the way they are constructed. The natural resources maintain a direct association with the landscape through their physical qualities. The quality, texture and variety of colour of natural and untreated materials used to build vernacular dwellings add to the overall aesthetic quality and appeal of the buildings. Slate and stone weather very little, but hold nature's marks and show great variety in colour. The imperfections and weathered patina acknowledges the buildings' transience and uniqueness, while reflecting the handmade craftsmanship. Hughes and North describe how 'nature, if we will only allow her, will provide us with ornament finer than the most delicate carving, more subtle than the most intricate pattern.'⁶⁸ This is in relation to the weathering of materials of cottages in Snowdonia. This metamorphosis of buildings surfaces is described in the book *On Weathering* as 'Finishing ends construction, weathering constructs finishes'. 'Weathering is not only a problem to be solved, or a fact to be neglected, but it is an inevitable occurrence to be recognised and made use of in the uncertainties of its manifestation.'⁶⁹ There is ambiguity in how materials will age and this is not always in an aesthetically pleasing way. There is therefore a need to appreciate the durability and the way in which materials will be modified by the elements and by human use. This is alongside the desire for maintenance free materials.

This principle therefore considers a range of factors which affect decisions in specifying materials from practical to aesthetic values. As natural materials specific to a locality are often no longer available as they were in the building of vernacular dwellings, alternative options must be explored which encompass these qualities. In addition consideration of building simply is required as discussed in the previous principle.

⁶⁶ Richard Suggett, 'Timber versus Stone: Preferences and Prejudices in Late Medieval and Early Modern Wales' in *Stone in Wales: Materials, Heritage and Conservation* (Cardiff: Cadw, 2005), p. 70.

⁶⁷ Juhani Pallasmaa, *Eyes of the Skin: Architecture of the Senses* (Chichester: John Wiley & Sons Ltd., 2005)

⁶⁸ Harold Hughes and Herbert L. North, *The Old Cottages of Snowdonia* (Capel Curig: Snowdonia National Park Society, 1979), p.74.

⁶⁹ Mohsen Mostafavi and David Leatherbarrow, *On Weathering: The Life of Buildings in Time* (Cambridge, Mass: MIT Press, 1993)

7.3.8 Cultural elements of the building tradition



It has been identified in the research that this principle is critical in retaining meaning in design through the continuity and translation of cultural aspects of tradition in contemporary design. The thesis illustrates how this principle is often disregarded in contemporary design and is rarely evident in examples of best practice. The thesis explores how cultural aspects of building traditions can be adopted and applied to design and have relevancy for today.

The research proposes that myths and traditions have helped shape the vernacular Welsh house and its connection with the surrounding landscape in a range of forms. Myths have revolved around and emphasised elements of the house that were essential to everyday lives of the people. Analysis suggests that there is practical reasoning behind these myths and traditions. The hearth and thresholds are key foci of the home myths revolved around. Myths have also influenced the making of places and informed the way in which spaces were created and inhabited, and how building fabric was marked and decorated. Cultural meaning behind traditions and rituals has adapted or been lost with changes of use, material and form, as their relevance to society changes with time. Paradoxically, conventions and rituals are sometimes continued without recognition of their reasoning. The thesis argues that these deep rooted customs may be revisited and evaluated in terms of the design of the contemporary home.

However it is essential to understand why these elements have developed, and as Gion A. Caminada states, 'where did it come from, what criteria, what qualities were important to make it emerge as it has? If we learn to understand... then we find out how to think about developing the building tradition. Then it is possible to create diversity and new things within the tradition, without coming up with picturesque, superficial reproductions.'⁷⁰ As Vellinga maintains, tradition is creative and adaptive,⁷¹ so it is important to ensure traditions remain relevant.

Writer George Mackay Brown understood that 'meaning' emerged only through continuity⁷². It is this continuity of tradition and abstraction of the essential features of the vernacular that

⁷⁰ Gion Caminada, 'Meaningful Architecture in a Globalised World' in *The Architect, the Cook and Good Taste*, ed. by Petra Hodgson and Rolf Toyka (Basel: Birkhäuser, 2007) pp. 82-93 (p.86).

⁷¹ Marcel Vellinga, 'Engaging the Future' in *Vernacular Architecture of the twenty-first century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006)

⁷² Mhairi McVicar, 'Memory and Progress: Confessions in a Flagstone Wall', *Architectural Research Quarterly*, 11. 3/4 (2007), (p.199).

can be subtly incorporated in modern design to create meaning to built form. Traditions can still give meaning to the home and can be translated into design to give identity to place and inhabitation.

Traditions surrounding elements of the Welsh house are discussed below:

Hearth

In Wales the hearth (*aelwyd*) has been the physical and social core of dwellings. Houses developed around the hearth with the fire being the focus. Fundamental aspects of life revolved around it including keeping warm and dry, cooking and eating, sitting and socialising and providing light to carry out tasks. The importance of the fire in the home influenced the development of myths and traditions around it. Its significance in myths strengthens the fire's great importance to humans, as one of life's essential elements and it also highlights the mystery behind it and its divine associations.

The identification of myths surrounding the fire emphasise its importance as a permanent and everlasting feature of the home. The significance of the fire and hearth can be seen in the early medieval Welsh Laws, which primarily date from the twelfth century. The grounded element of the hearth was the *pentanfaen*, 'the stone head-of-the-fire', placed vertically behind the fire. In the Welsh Laws, it is stated that once the *pentanfaen* was 'placed in position it was an offence to remove it. The house itself might be destroyed, the owners might desert the site... but the *pentanfaen* was never removed. It stood as a perpetual sign that the site where it stood was the site of an occupied homestead'.⁷³ The significance of the *pentanfaen* in Welsh Laws emphasises the perception of the hearth being the core of the home, grounded to the earth and preserved as a direct representation of the place of a dwelling. It also suggests the hearth has a deeper, sacred meaning, the *pentanfaen* being inviolable when the house is no longer lived in.

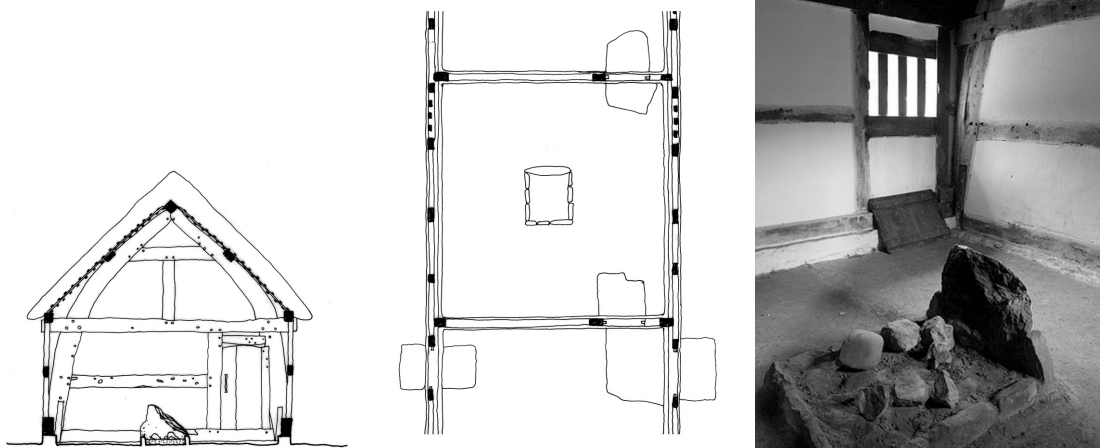


Fig. 7.65 Section showing central hearth with stone fire back, *pentanfaen*, at Hendre'r-ywydd Uchaf, St.Fagans; Fig 7.66 Plan showing central hearth; Fig. 7.67 Photograph of Hendre'r-ywydd Uchaf

⁷³ T. P. Ellis, *Welsh Tribal Law and Custom in the Middle Ages. Vol. II* (Oxford: Clarendon Press, 1929), p.164.

The practice of maintaining a continuous fire is a tradition attached to many Welsh homes, where the fire has not gone out for centuries. 'All efforts were made to keep the fire alive and, although dampened down, it burnt all night,'⁷⁴ as it was believed to be bad luck if the fire was to burn out.⁷⁵ The term *benthig tân*, 'to borrow fire' shows that, for the rekindling of fire, or in the case of new hearths, fire was obtained from what was known as *tân byn*, 'living fire'.⁷⁶ When a new household was being started, fire was carried from the parent hearth, and in removals people would take coal from the old home to light a fire in the new. These traditions illustrate how precious fire was to the people in their effort to keep it alive.

Another tradition where the fire had significance in laws was in the *Tŷ Unnos*, 'one night house'. During the late eighteenth and early nineteenth centuries, many rural poor were left without homes and access to grazing due to enclosures of the land. A house built on common land between dusk and dawn and lived in for a year without alterations and any challenges, allowed the inhabitants to claim the right to the property and the surrounding land as far as an axe could be thrown. One condition was that smoke had to ascend from the chimney by sun rise on the morning of the build. The importance of smoke rising from the chimney suggests the structure then becomes a house and the place of an occupied dwelling.

The hearth as a primal element of the home has differed and developed greatly over time in its features and positioning within the dwelling. The form of the hearth has dictated how people have used and gathered around it. Initially, the fire was situated in the middle of the floor in roundhouses and to begin with, in later rectangular houses. The hearth was open on all sides, and people surrounded it, with the *pentanfaen* to the back of the fire and the fire-dog and hearthstone to the front of it.

The location of the fireplace changed from the mid sixteenth century onwards in cottages and farmhouses to an enclosed one, against a wall of the dwelling. This changed the focus of the main living space of the house from the dais table, aside from the fire, to the hearth itself. Previously the central hearth had divided the room both physically and socially, whereas in its new position to one side of the room the hearth became the focus.

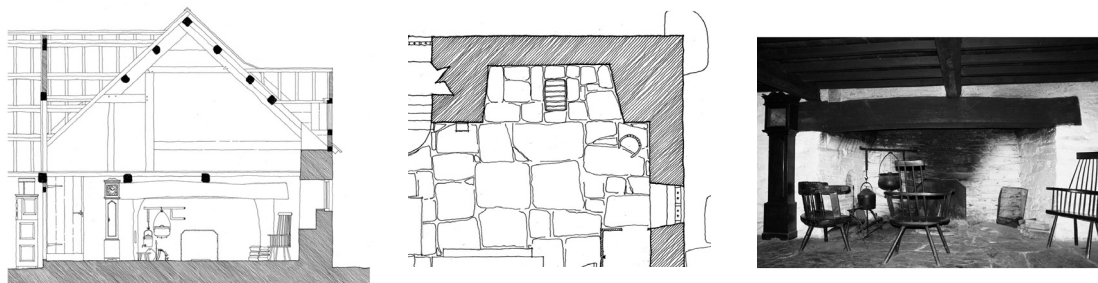


Fig. 7.68 Sectional elevation of the main hearth at Cilewent longhouse, St Fagans showing the iron fire back; Fig. 7.69 Plan showing the hearth positioned against the wall; Fig. 7.70 Photograph illustrating how people gathered around the fire

⁷⁴ Eurwyn Wiliam, 'Yr Aelwyd: the architectural development of the hearth in Wales,' *Folklife*, 16 (1978), 85-100 (p.92).

⁷⁵ Gwynn T. Jones, *Welsh Folklore and Folk-Custom* (Cambridge: Brewer, 1979), p.179.

⁷⁶ *Ibid.*, p.179.

The hearth located against the wall introduced the opportunity to build furniture around it. The *sgiw* or *setl*, characteristic of Welsh farmhouses, provided a bench by the fire which also screened out any draughts. An inglenook similarly offered a warm and intimate place for the family to gather around the fire, in effect creating a room within a room. The architecture of the fireplace within a dwelling affects the organisation of the space and the making of places around it.

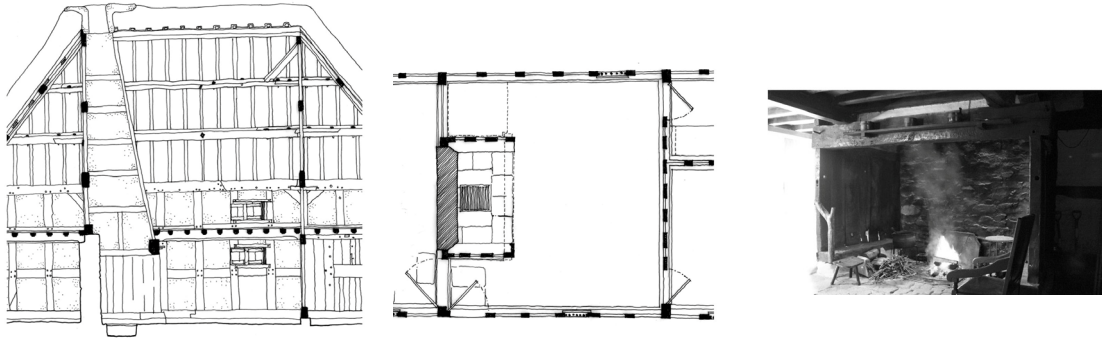


Fig. 7.71 Section through hearth at Abernodwydd; Fig. 7.72 Hearth enclosed by sides of timber, which incorporate settles on either side of the fire and creates an inglenook. The positioning of the hearth creates a lobby-entry to the hall; Fig. 7.73 Iron fire back in front of a stone built wall

The relocation of the hearth from its original central position to that at the edge of the room, gave rise to the decoration of the surrounds and over mantles of the fireplace. Families' most treasured possessions would be displayed above the mantle, strengthening the hearth as a focal point of the room.

The position of the fire in Welsh longhouses, where people and animals were housed under one roof was significant. Stemming from the early Celtic belief that fire protects animals from evil spirits and other harms, there was a conviction that 'warmth increases the yield of milk' and that cattle would yield more milk if they could see the flames of the fire, as some cows would have been able to at Cilewent longhouse.⁷⁷

As traditions of the hearth developed and moved on, folklore surrounding it has been lost. Once the fire was placed against the wall, cast irons firebacks replaced the *pentanfaen*, as they were more long-lasting, and protected the stone wall behind the fire. They also changed shape and became greater in height than width, compared with the low, wide fireback stones in the old open fireplaces. This development of the *pentanfaen* would have made laws of its removal irrelevant. Cast iron is less substantial and not intrinsic to its place as stone is. Where the fireback stone remained in cottages, the top of it, the *pentan*, was used to hold kettles and rest things on. It developed outwards on both sides of the fire, to become hobs or *pentannau*.⁷⁸ Through tradition the core element of the hearth, the *pentanfaen*, which signified the home was adapted to become a functional feature of the fireplace for cooking. Its cultural meaning as the foundation of the house disappeared with its change in function and material.

⁷⁷ Iorwerth Peate, *Tradition and Folk Life: A Welsh View* (London: Faber and Faber, 1972), p.32.

⁷⁸ Eurwyn William, 'Yr Aelwyd: the architectural development of the hearth in Wales,' *Folklife*, 16 (1978), 85-100 (p.91).

In the contemporary home more economical and efficient energy methods are available. Central heating, cookers, and electric lights mean that the hearth is practically redundant, or at least not required to heat the whole space, but has become an additional supply of warmth in the house or even a visual feature. Central heating has allowed far more open plan living and the inhabitation of places are not dictated as to where the fire is.

The once fundamental element of the home is now often considered a luxury. Even when a working fireplace has not been built, the quintessential image of the home with the fire being at the heart of it is commonly translated symbolically in contemporary dwellings in the form of mantles without the possibility of fire. The fireplace has often been flattened to a visual and decorative object, devoid of its essential task of giving warmth, questioning the relevance of the fireplace in the home today.

The fire does however, 'retain its role as the focus of a particular place for sitting and reading, talking, knitting, or perhaps dozing'⁷⁹. The fire creates a pleasant contrast to the monotonous and temperate environment central heating generates. It still remains an important identity of dwelling. The chimney externally and the hearth internally suggest sensory and physical warmth. The fireplace and chimney create a vertical sculptural element to a space which connects with the ground. It can divide a space to create more intimate places and prescribe the form and organisation of a space. The dominating presence of the element in the room makes it a focal point. The sculptural form of a fireplace helps identify the room as a living and communal family space. The hearth's significance in contemporary design is also to do with notions of place making – from the ritual of making and lighting the fire to social relationships and sensory effect.

Threshold

In mythology, doors and gates traditionally mark the threshold between different worlds and rites of passage. Mystery surrounding the door relates to unknown dangers of the other side. The door however, symbolizes 'hope, opportunity, opening and the entrance of a new life, initiation and shelter'⁸⁰. The doorway itself and the act of crossing the threshold have been shown to have symbolic and even religious significance throughout history.

Functionally the door acts as a boundary, enclosing space and acting as a connection between inside and outside. It protects from the elements, provides security and warmth. The doorway necessitates the transition from public to private, from inside to outside, from light to dark. A porch can mediate and prolong this transition.

Traditionally in Wales it was usual for visitors to a house to simply call out 'Are any people here?' and if there were to let themselves in. It is understood, 'that in a normal everyday

⁷⁹ Simon Unwin, *Analysing Architecture* (Abingdon, Oxon: Routledge, 2003), p.80.

⁸⁰ *Ibid.*, p.80.

experience entry into the house was easy, informal and unrestricted.⁸¹ Those who paid a visit would be welcomed to the home and offered food. In addition to 'credit accruing to a good host in the spiritual world, the belief that wealth spent on hospitality would bring further wealth,⁸² is also recognised.

Admission to the home could not be completely open, as this would undermine the ritual function of the threshold and doorway. Entry to the house was formalised or even ritualised on special occasions. On the day of a wedding there would be

a mock poetic contest between those inside the house, and those outside seeking entry... it constituted a special form of the 'quintain' or ritual hindrance of the wedding, when the 'young man's party' (the *shigowts* or 'seek-outs') came to fetch the bride. Obstacles of all kinds were placed in the farmyard and lanes to prevent access to the house; the door was bolted, and it was there in the doorway, through the closed door, that the contest in verse took place. Local characters who were well known versifiers sometimes gave assistance in the drawn out contest which would involve singing several verses and responses, before the door was opened and the visitors allowed in. The 'seek-outs' sometimes succeeded in carrying off the bride on horseback, only to be overtaken on the way to the church.⁸³

The girl and her family maintain control over entry and a refusal to accept access straight away stresses her importance to her relations and the significance of her decision to cross the boundary from her family home to a new one.⁸⁴ The threshold symbolises a perimeter distinguishing protection within the home and the world beyond.

Ritual entry to the house is also found in folk traditions linked with certain calendar customs and involved the practice of carrying a ritual object from house to house. A Christmas and New Year custom of *Mari Lwyd* entailed a man to carry a horse's skull covered beneath a white cloth and decorated in ribbons from door to door after dark. The party would dress up alongside the *Mari* and engage in a poetic contest of questions and answers until the door was opened.⁸⁵ Entry depended on verbal skill, but was rarely forbidden. It has been suggested that the ritual entry recital was used to prolong the entry, rather than refuse it.⁸⁶ Once inside the *Mari Lwyd* 'paid special attention to the womenfolk, nudging, blowing, neighing and biting them, besides talking', while other members of the group often kissed the women of the household.⁸⁷ It is understood that 'both ritual entry and... tradition focuses on the women as the source of the 'bounty' the visitors have come to seek'⁸⁸. The enhanced awareness of the threshold through the ceremonial act of entry is vital to these traditions. The door maintains the control to communicate and enclose, to protect and hide and is instilled with symbolic and historical significance.

⁸¹ Trefor Owen, *The Customs and Traditions of Wales: a Pocket Guide* (Cardiff: University of Wales Press, 1991), pp.40-41.

⁸² Neill Martin, 'Ritualised Entry in Seasonal and Marriage Custom', *Folklife*, 46 (2008), 73-95 (p.74).

⁸³ Owen, p.41.

⁸⁴ Martin, p.91.

⁸⁵ *Ibid.*, p.79.

⁸⁶ *Ibid.*, p.80.

⁸⁷ Owen, p.54.

⁸⁸ Martin, p.82.

Decorative charms and objects

The door has also been a vital location where decorative charms and objects were placed for spiritual reasons, whether hidden within the building fabric or displayed in the doorway. Two 39cm tall oak figures, placed side by side just inside the front doorway at Kennixton Farmhouse once situated in Llangennydd in the Gower are believed to be a protective device to keep the house safe from evil. The positioning of human and subhuman figures beside doorways and also fireplaces is just one of a range of objects used as a protective device in the dwelling.⁸⁹



Fig. 7.74 Carved oak figures found in the doorway at Kennixton Farmhouse

Decorative charms were commonly placed in and around the home. In some cottages 'a band of about six to eight inches wide was habitually blackleaded and a white pebble placed here and there on it, close to the wall or under furniture. Frequently stones are found outside as well, one on each side of the doorstep.'⁹⁰ The reason for this random selection and arrangement of objects appears uncertain, but perhaps were displayed for decorative purposes. There is an aesthetic beauty and simplicity in placing natural, modest objects on a plain, yet contrasting surface. The charm survivals however are profusely found in areas where indications of the use of adornment are lacking, mainly due to certain Methodist and Non-conformist religious notions widespread in Wales during the later part of the eighteenth and first half of nineteenth century. These conceptions 'had the effect of suppressing decorative instinct as a manifestation of pride and vanity, with the result that, even to the present day, Welsh villages generally lack any attempt at adornment.'⁹¹ This practice demonstrates the power of contrast and patternmaking within a minimalist interior.

Garments and shoes have been found within the fabric of buildings and appear to have been concealed there deliberately. A pair of a child's shoes was found during building work at

⁸⁹ Eurwyn Wiliam, 'The Protection of the House: Some Iconographic Evidence from Wales', *Folklore*, 89.2 (1978), 148-153 (p.152).

⁹⁰ Gwynn T. Jones, *Welsh Folklore and Folk-Custom* (Cambridge: Brewer, 1979), p.176.

⁹¹ *Ibid.*, pp.176-7.

Bryncyn cottage in Carmarthenshire. They were found within the back wall of the cottage. Deliberately concealed garments have been found hidden in buildings across the world and many of the found items have been heavily worn, and some have been discovered creased or even soiled. Other found garments have been discovered which appear to have been intentionally damaged before being buried.⁹² The soles of the shoes found at Bryncyn had been worn through in places before being hidden in the building fabric.



Fig. 7.75 Soles of children shoes found within the building fabric during restoration at Bryncyn cottage, Carmarthenshire

There is no recorded documentation of this practice, noted at the time the customs were carried out. This could be because people were unable to write or because of records did not last.⁹³ It may have been a custom which was practiced but not talked about and possibly the act of discussing it would hinder the effects of the concealment.⁹⁴ Commonly it is suggested, the tradition of hiding garments within the home was done as a ritual protection of the building. It has been linked to the custom of hiding various other objects in and around the home and of mark making on the building fabric.

A number of thoughts and connections have been made regarding this practice. It has been suggested that garments chosen to be hidden, 'bear the imprint of the wearer'⁹⁵, and that shoes 'stand in for the person'⁹⁶. Metaphorically, it has been put forward that the 'concealing of garments was a way of clothing (and possibly thereby protecting) the body of the home... garments protect the body of the wearer and that the house protects its inhabitants'.⁹⁷ Hidden within the building, the garments are protected from wear and disposal. Superstitions enduring behind the placing of garments within a building have instigated the common reaction of returning objects to the place they were found within in the house. The shoes were not removed from *Bryncyn* for this reason.

Objects placed within a cache in the building fabric are often in voids, hidden from view, where no attention is paid. Only the positioning of the object and the appearance of it can indicate reasoning for it being there. 'These material memories are forgotten, or not known

⁹² Dinah Eastop, 'Outside In: Making sense of Deliberate Concealment of Garments within Buildings', *Textile*, 4, 3 (2006), 238-255 (p.242).

⁹³ *Ibid.*, p.245.

⁹⁴ J. Swann, 'Shoes Concealed in Buildings', *Costume: The Journal of the Costume Society*, 30 (1996), 56-69 (pp.65-67).

⁹⁵ Eastop, p.247.

⁹⁶ Swann, p.56.

⁹⁷ Eastop, pp.247-249.

about, except possibly in the belief that objects may exist in old buildings.⁹⁸ Dwellings contain and preserve secrets of past occupants, rarely uncovered and never removed from the house.

The hiding of objects within the construction of buildings relates to the home itself as a place where we hide our secrets and express our private selves. The house contains personal and intimate secrets, which are expressed through our own objects and memorabilia we display or choose not to. An object placed within the simplicity and minimalist nature of traditional Welsh dwellings has a more powerful effect in such an austere space. As objects tend to be hidden in the building fabric as a ritual to induce protection, it highlights the building structures importance in providing a feeling of security and safety within the home to its occupants.

Marks and patternmaking

Marks ingrained in different textured surfaces indicate how buildings have been used over time. Some of these marks have materialised naturally through continuous usage, whereas others are deliberate markings made for functional use or because of spiritual beliefs. Carpenter's marks on timber-framed structures were inscribed to aid in the construction of the building. Graffiti marks were made and tally marks were used in barns to keep track of crops. However there are also marks that don't appear to have any bearing on the function or construction of the building. Some of these marks may have been put on the building during construction and some appear to have been added later, perhaps during additions to a property, to evoke protection for the building, its occupiers and contents within it.⁹⁹

Angled tear drop-shaped burn marks are found on the timber lintel above the fireplace at Llannerch y cawr longhouse in the Elan Valley, mid Wales. The multiple charred marks are clearly deliberate and not accidental tallow burns; they appear randomly spaced along the structural timber and are of a sizable depth and length. It is believed they would have been placed intentionally in an attempt to induce protection of the building from fire, literally 'fight fire with fire'.

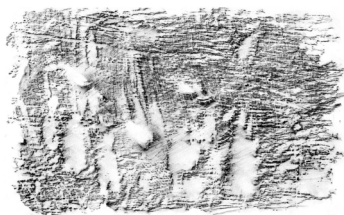


Fig. 7.76 Angled tear drop-shaped burn marks on the timber lintel above the fireplace at Llannerch y cawr longhouse, Elan Valley

The custom of pattern making on floors was widespread in Wales and was known to have still been practiced after the Second World War. Series of geometric patterns, commonly crosses, circles and wavy lines were applied to the floor with chalk, clay, rubbing stone, or a variety of

⁹⁸ Ibid., p.251.

⁹⁹ Shona Robson-Glyde, 'Averting Evil: Evidence from Worcestershire Buildings,' <http://www.worcestershire.gov.uk/cms/pdf/2010_averfing_evil.pdf> [accessed 9 May 2011]

leaves, after it had been washed. The tradition was carried out in farmhouses, cottages and terrace houses. Patterns varied from place to place, and in some areas families would have their own distinct pattern, which would be passed down from generation to generation.¹⁰⁰ The most widely used patterns were very simplistic, this may have been as practically they were the easiest and quickest patterns to follow or they could have been chosen as bold symbols to convey a more effective message.

The ornamentation was predominantly made on the hearthstone and around the hearth. Chalk was sometimes rubbed underneath furniture or decorated around the dresser and the long case clock, and sometimes along the edge of walls.¹⁰¹ Some housewives would even pattern the flagstones of the yard.¹⁰² The stone slab doorstep, which was often undressed, would be washed daily and whilst wet chain-like patterns would be chalked into the slab in various forms.¹⁰³ It has been noted how unique patterns were made for special visits to the house and how in some cases they were washed away after the guest had left.¹⁰⁴ Otherwise it has been recollected that the pattern would be unaffected by a number of washes.¹⁰⁵

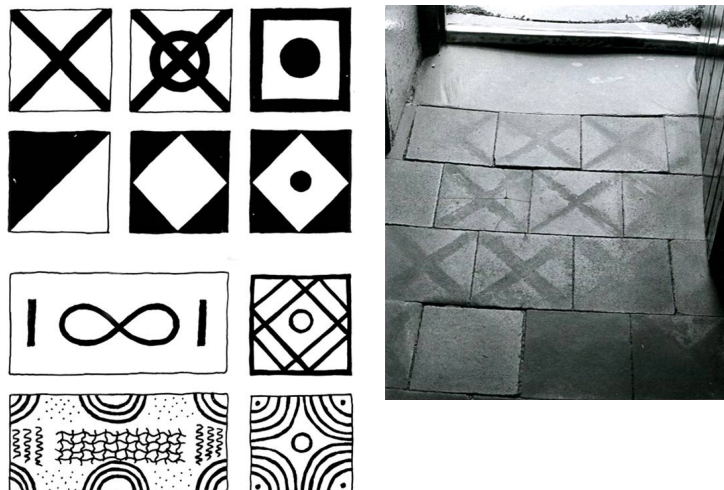


Fig. 7.77 Common and simplistic patterns found decorated on floors of Welsh dwellings, together with more intricate and personalised markings; Fig. 7.78 Simple cross markings were found at New York, Mynytho, Caernarfonshire made by rubbing oil into the hard, clay floor tiles daily

Marks in general were mostly made around doors, windows and hearths. Hearths in particular were regarded as vulnerable as doors and windows could be closed, whereas the hearth was open. The markings around the fireplaces, doors and windows were made as a form of protection against witches entering the building to put curses on the occupants.¹⁰⁶ Elaborate floor decorations were regarded to have been important, powerful magic symbols which were

¹⁰⁰ Eurwyn Wiliam, 'To keep the devil at bay,' *Country Quest*, May (1975), 34-36 (p.34).

¹⁰¹ Iorwerth Peate, *The Welsh House: A Study in Folk Culture* (Burnham on Sea: Llanerch Press, 2004), p.171.

¹⁰² Eurwyn Wiliam, 'To keep the devil at bay,' *Country Quest*, May (1975), 34-36 (pp.34-5).

¹⁰³ Gwynn T. Jones, *Welsh Folklore and Folk-Custom* (Cambridge: Brewer, 1979), p.176.

¹⁰⁴ Eurwyn Wiliam, 'To keep the devil at bay,' *Country Quest*, May (1975), 34-36 (p.36).

¹⁰⁵ *Ibid.*, p.34.

¹⁰⁶ Shona Robson-Glyde, 'Averting Evil: Evidence from Worcestershire Buildings,' <http://www.worcestershire.gov.uk/cms/pdf/2010_averfing_evil.pdf> [accessed 9 May 2011]

evil defying in intent.¹⁰⁷ They were one of the many customs relating to securing the wellbeing of the home.

Pattern making was still being done even as spiritual beliefs dwindled. It is probable that the making of marks became a ritual in itself and lost its original meaning. Principally in more recent times people followed the tradition of adorning floors with patterns passed down by their mothers, but only understood them for decorative purposes.¹⁰⁸ There was no longer any reason to create protection but the marking still continued. It is probable that the making of marks passed into a folklore tradition.¹⁰⁹ Similar pattern making has appeared to have been used in other traditional Welsh crafts, significantly in traditional Welsh quilt making, where some of the same geometric patterns are applied repeatedly.

Besides having been done for spiritual reasons, mark making and pattern marking to surfaces of the dwelling is a way of personalising and adding identity to the home, through unique designs. The impermanence of the practice enables patterns to be changed and reapplied cheaply and easily. It is a transient form of art or adornment applied to a specific place, in the midst of the simplicity elsewhere in the house. The most intricate pattern found in these dwellings is in the intrinsic colour and texture found in natural materials, the pattern making made on top of these materials of the building are bold and abstract in comparison.

Colour

Use of colour was fundamental in households in influencing the appearance of the inhabitants surroundings and their well being. Economic, historical and social reasons shaped the traditional use of colour in and around the home. Colour selection was determined by availability, the associations linked with colours, the actual or believed usefulness of colour and the contrast between them.¹¹⁰ The customs handed down in families gave 'feelings of belonging and of "doing the right thing"'.¹¹¹ It shows traditions were continued because of a feeling that they should be, despite not understanding the reason why.

Colour is used for aesthetic reasons, but also for communication and safety. Colour coding was used for identification, such as demarcating ritual areas and for symbolism.¹¹² Rites of passage and special occasions or seasonal events were identified by colour and appearance. The powerful use of colour was used to make events immediately recognisable and evidence that the gathering was being done in the appropriate way.¹¹³ Some of the colours traditionally used for these events have been continued up to the present day.

¹⁰⁷ Eurwyn William, 'To keep the devil at bay,' *Country Quest*, May (1975), 34-36 (p.36).

¹⁰⁸ D.M.R., 'An Old Custom', *Bye-Gones*, Oct 28 (1896), 457.

¹⁰⁹ Shona Robson-Glyde, 'Averting Evil: Evidence from Worcestershire Buildings,' <http://www.worcestershire.gov.uk/cms/pdf/2010_averting_evil.pdf> [accessed 9 May 2011]

¹¹⁰ John Hutchings, 'Colour in Folklore and Tradition – The Principles,' *Colour Research and Application*, 29.1 (2004), 57-66 (p.57).

¹¹¹ *Ibid.*, p.57.

¹¹² *Ibid.*, p.64.

¹¹³ *Ibid.*, p.65.

Information can be communicated more effectively if there is a visible contrast in colour. The greater this difference is, the more evident the information is conveyed. Black and white together shows the greatest distinction, as with light and dark. Throughout Wales it was common to whitewash the fire itself wherever culm was burned. The culm would form a hard crust around the fire which would be whitened. It was believed that this practice would make the fire burn better.¹¹⁴ Around the hearth and base of the walls were often blackleaded or painted with coal tar, this meant the white painted fire would be really striking, as would any white patterning drawn around the hearth.¹¹⁵ These colours were easily available, white from clays and black from fire. The stark contrast in colour may have been used to convey a message more strongly.

Black and white is traditionally displayed at a time of death. Although black is commonly associated with mourning, the traditional laying out room is white. In Carmarthenshire doorsteps and window sills would be whitewashed at the time of a funeral. The walls of the yard around the house would also be whitened. This was also done for the arrival of visitors.¹¹⁶ White flowers, such as snowdrops, were considered 'funeral flowers' and must never be allowed in the house. Giving red and white flowers together to a patient must never be done as it would result in death.¹¹⁷

Red is another significantly used colour, it often symbolises the colour of blood and is used to frighten or protect. Kennixton farmhouse at St Fagan's, is painted a deep red, as it was seen as a means to avert evil spirits. It would have originally been a mixture of lime and ox-blood. However it is similar to the typical deep earth colours common at the time, such as madder, cinnabar, ochre, verdigris. Alongside the farmhouse is a strategically planted rowan tree (mountain ash) with red berries, also seen as a means of keeping evil spirits at bay and believed to safeguard cattle from sickness.



Fig. 7.79 A rowan tree sited in front of Kennixton Farmhouse and deep red walls of the house were allegedly supposed to have averted evil spirits. The garden around the house is planted with herbs.

The actual colour range of red includes paler and darker reds, browns, oranges, and some yellows, only excluding greens, blues and purples from the spectrum. There is a wide availability of red, which can be sourced from minerals, blood, burned earth and vegetables.¹¹⁸ 'Roots, bark and other parts of the tree were useful sources of dye, particularly

¹¹⁴ Eurwyn Wiliam, 'To keep the devil at bay,' *Country Quest*, May (1975), 34-36 (p.35).

¹¹⁵ *Ibid.*, p.34.

¹¹⁶ *Ibid.*, p.36.

¹¹⁷ Hutchings, p.65.

¹¹⁸ *Ibid.*, p.64.

black and purple. Alder bark, wood and catkins were used in dye making. In some cases different parts produced different colours: elder bark and roots were used for black dye, elder leaves for green dye, and the elder berries for blue or purple dye.¹¹⁹

The importance of the colours black, white and red extends to objects that are of these colours, such as coal, salt and the Rowan tree. These particular objects were extremely important in the household, coal for warmth; salt was seen as magical and powerful preservative and the rowan tree protective. The main colour not mentioned is green which was believed by many people to be an unfortunate colour.¹²⁰

Associations of objects with colour are developed through culture, through what is familiar, and they can acquire meaning through colour. However the most significant colours associated with myths appear to be those which were easiest to obtain. Application of colour can seem superficial but can hold deep-rooted associations and communicate powerfully. It has been seen that contrasts of light and dark were used to distinguish places and objects within a space to highlight difference and importance. A similar approach can be applied today to give distinction between places through qualities and quantities of light and shadow, as well as use of colour.

Landscape

There is an innate connection between dwelling and the landscape, and myths and traditions evolved from the surrounds of the house including trees and plants of the immediate landscape and certain features and markers of its setting.

Trees and plants

Commonly valued for their timber, trees however in the past 'had a far wider economic and social significance, supplying local communities with raw material including bark for tanning and plaiting, bast and roots for weaving and ropes, leavings and branches for bedding and fodder, sap for drink and adhesives and fruits for eating. In addition many parts of the tree were used in the preparation of medicines'.¹²¹ Various parts of trees were believed effective against a range of ailments.

Trees were planted near houses, not only for shelter from the weather, but for protective purposes. A rowan tree planted nearby a dwelling was seen to protect against evil spirits, and numerous place-names involve the name of this tree. Elder was often planted in front of cottages to deflect evil spells also. It is customary to find vast hawthorns near old houses.¹²² Similarly plants and shrubs were grown in gardens or close by dwellings, which were

¹¹⁹ Caroline Earwood, 'Trees and Folk Medicine,' *Folklore*, 38 (2000), 22-31 (pp.26-7).

¹²⁰ Jones, p.199.

¹²¹ Earwood, p.22.

¹²² Jones, p.175.

understood to hold protecting properties. These were often named after Christ, the Virgin and the Saints such as *Llysiâu Crist*, milkwort; *Chwys Mair*, buttercup; *Ysgol Fair*, St. John's wort. Some plants bear the names of native wizards, such as: *Llysiâu'r Hudol*, vervain 'the wizard's herb'; *Cas gan Gythraul*, 'the devil's hate'; *Llygad y Bwgan*, corn poppy 'spirit's eye'; *Bysedd Ellyllon*, foxgloves 'elves' fingers'.¹²³ *Llysiâu Pen Tai*, 'sengreen,' was grown on small projections surrounding the chimneys or on the tops of walls, particularly on slate roofs as it was thought the presence of the plant brought luck to the household.¹²⁴

It was considered unlucky to bring certain flowers into the house at particular times. Daffodils were not allowed in the house before Easter as it was thought this would prevent the goose eggs from hatching. Snowdrops were never brought indoors. Although hawthorn was considered a safe-guard externally, it should not be used inside the house for table decoration.

In herbal remedy publications, the art of healing was primarily by the means of herbs, however many contained superstitions particularly stressing the importance of astrology and theology in connection with the use of herbs.¹²⁵ It can be seen in 'The Physicians of Myddfai', that illness was linked to demonic possession, as the cure for Typhus fever is to...

'Take a handful of rue, sage, and a portion of fennel seed, pound them together; pour two quarts of good bottled wine thereon. Let it stand well covered for three hours, so the spirits may not evaporate. Drink four spoonfuls in the morning fasting. It is good for all pestilent diseases.'¹²⁶

Regardless of a limited understanding of the cause and effect of many illnesses as is understood today, 'The Physicians of Myddfai' demonstrates an in-depth knowledge of the nature and properties of plants.

Over and above trees and plants possessing deep rooted cultural meaning through their various uses and the powers people believed they possessed, the local trees are well suited to the country and have adapted to poor soils and strong gales to survive on the mountain slopes. It is perhaps the hardy nature and diversity of certain trees and plants that can explain inhabitants of Wales regard for them and their association with safety and protection. The real native trees of the country are in harmony with their setting in function and use, colour and character.

Landscape features and place names

Features of the landscape can be identified as markers to a particular place, which stands out from its surroundings. These could be a mountain, river, tree or stone. It was believed that spirits lived in some of these entities, in moors, forests and marshes, considered waste places.¹²⁷

¹²³ Ibid., p.175.

¹²⁴ Ibid., p.177.

¹²⁵ Earwood, pp.22-23.

¹²⁶ John Pughe, trans., *The Physicians of Myddfai* (Felinfach: Llanerch Publishers, 1993), p.417.

¹²⁷ Earwood, pp.22-23.

Springs and wells in comparison were regarded as sacred and as containing healing properties.

Place names in Wales are made up elements that describe a place or a response to an environment, and usually refer to landscape features. Place names can be topographic, referring to the features of the landscape, or they can describe the settlement in which people live. They often consist of an element such as a river, an archaeological site, a building, a person or vegetation and another element, which describes and greater defines the location in relation to an object in the environment, such as the size or positioning. For example Pentrebach 'small village', Betws y coed 'chapel in the wood' and Bryn y Mor 'the hill by the sea'.

There is also supernatural influence in Welsh place names for example *Llannerch y cawr* 'giants clearing', *Craig y Cythraul* 'devils rock', *Cadair y Cythraul* 'the demons chair', and *Cwngwrach* 'valley of the witch'.

The physical naming of place through the description of it, suggests the importance and recognition of the environmental landscape. Place names can be interpreted to have meaning as they are derived directly from the landscape and even though an element name may not appear to belong to a place any longer; there is an appreciation that it was once the site of something specific and crucial to that place. The close interrelationship between dwelling and surroundings is reiterated here as similarly homes can be named through descriptions of the landscape around them. There is opportunity for this innate connection of built form and place to be continued, through the recognition of surrounding landscape and place.

The traditions of the Welsh house have been incorporated and abstracted in the following images to identify how the elements of tradition can help inform placemaking in the contemporary house.

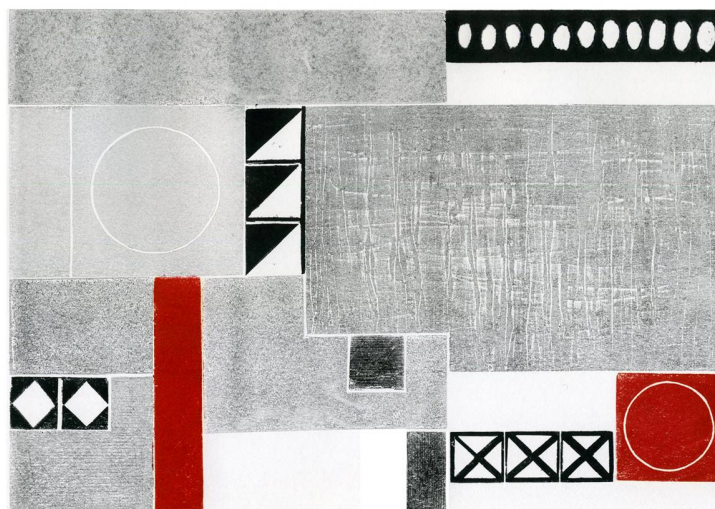


Fig. 7.80 Author's interpretation of abstraction of elements from the Welsh house and landscape relating to myth and tradition

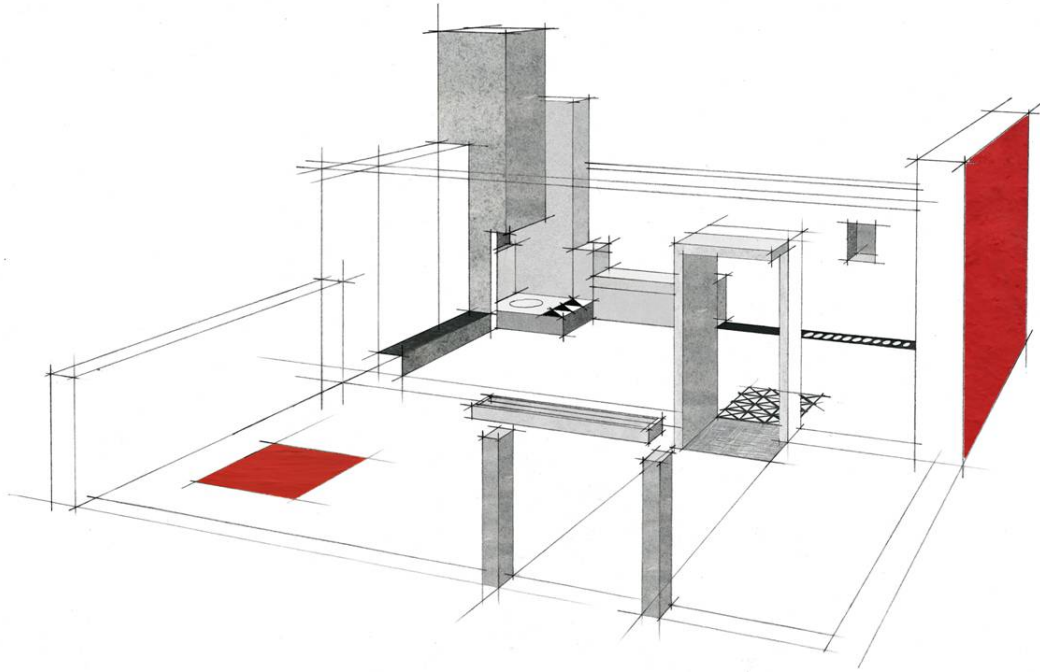


Fig. 7.81 Elements of myth and tradition reinterpreted by author in the theoretical design of the place

Therefore an architect can 'find' or 'abstract' elements that provide continuity from tradition, however this must be justified to be functional and economical to a degree, in order for them to remain relevant. The relevancy of the hearth has diminished, due to its function being redundant and economically not viable for affordable dwellings. However the thesis argues the hearth is still fundamental to the contemporary house as it combines environmental comfort, social and family traditions and is a visual signifier. Other traditions relating to the threshold, decoration and association with landscape can be implemented in design without significant added expense. However they would require additional design consideration to ensure the elements remain relevant to contemporary design.

7.3.9 Economy of means



Economy of means relates and impacts on many aspects of design with the ultimate aim to produce affordable design. This principle involves economy through efficient use of space within buildings, designing form effectively but to a minimum. It also requires the standardisation and repetition of elements, which can result in less wastage of resources and reduced costs. Expense of materials should be considered and building form should be affordable to construct.

Designing compactly is economical of space and cost effective in terms of material costs and energy use. However, in order to design to a minimum, a clear organisation of space is required, involving particular careful consideration of placemaking and detailed use of space. Space needs to be designed specifically for activities taking place and with consideration of arrangement of furniture within. This often necessitates fitted furniture to be designed. This means it is critical to understand the interaction between occupant and place and it is therefore necessary to design to a human scale in regard to space requirements for activities undertaken. Space can be divided according to function, for example a compact intimate sleeping area can allow more space to be given to living areas, where more time is spent. Open plan living demonstrated in traditional one room cottages, shows efficient and flexible use of space. Multifunctional use of space is therefore critical in designing space efficiently, balanced with intimately designed spaces which provide a variety of types of space to inhabit.

Adopting a standard method of construction and using inexpensive materials cuts costs, in addition to choosing a construction system which is quick to erect and requires few specialist contractors. The use of standard systems allows construction by local builders. Designing to a standard grid and structural arrangement, using typical sizes of materials is efficient and economical, reducing waste of cutting materials. Reclaimed materials can also be considered.

A design should be economical in consideration of whole life costs of a building, including energy consumption, durability of materials and maintenance required. Exposed and robust surface finishes can be more expensive but don't necessitate treatment and maintenance. Structural materials can often also provide the building finish, utilising a number of a material's properties.

Repetition of individual elements and form is economical and provides unity and order to design. The thesis recognises that a balance between repetition and variety should be provided so occupants don't feel it necessary to individualise and change primary elements of their home. Facilitating the need for only small elements to be altered retains an aesthetic consistency and enhances sense of place. The structure of buildings should be designed to allow flexibility and change, and for occupants to alter and add to their dwellings according to changes in their spatial needs over time. Fixtures and fittings should be easily adjustable by the occupier. Dominic Stevens discusses that new buildings should be cheap to build and able to be repaired and adapted easily by the occupant. He believes that these vernacular ways have been lost as people have a tendency to overlook the qualities of the familiar.¹²⁸

The research emphasises that a balanced approach to economy of means should be recognised, as economies should not be driven over quality of design and architecture. As Christian Schittich states in *Building Simply*, 'small-scale, tightly budgeted projects may lead to architecture of substance.'¹²⁹ This highlights how economy of means can benefit design if carefully considered in the different ideas mentioned above to provide affordable building designs.

¹²⁸ Dominic Stevens, *Rural: Open to all, beginners welcome* (Ireland: Mermaid Turbulence, 2007)

¹²⁹ Schittich, Christian, *Building Simply*, (Basel: Birkhauser, 2005), p.9.

7.3.10 Summary

The analysis of identified principles informs an architectural position for design in the model. It illustrates the diverse range of directions which design can take, following these guiding principles. An approach was developed through architectural theorists' and architects' viewpoints, from knowledge previously gathered in the thesis and in case study examples, reasoned by the author's perspective. The principles analysed remain open for development through a final design study, however the defined principles provide greater focus for the research. A thorough analysis of principles recognises how issues within each principle overlap, so the principles are considered together as well as in detail separately.

The principles established have developed from the operational framework, which was set up at the start of the research. The principles are comparable to those determined in the matrix, including physical environment, construction, form, human factors and function. The principles for design have been further refined since the early stages of the research, but the basis is the same. The previous design studies have revealed that principles from the operational framework should be employed equally, to develop a holistic reinterpretation of tradition.

The principles however indicate that aspects of tradition, such as culture, beliefs, myths and personal experience may be as, if not more influential in design than the more objective and obvious principles of vernacular design. It recognised that some of the practical considerations important in vernacular design are less significant in design today, which allows experiential aspects of design to be made more prominent.

The principles will be applied and tested in a final design as follows.

7.4 Design

7.4.1 Introduction

The study focuses on a current housing typology that is in demand in rural areas. Elements from the previous foundation studies are relevant to refer to as some principles can be transferable to the design of a cluster of houses on the edge of a rural settlement. In Local Development Plans (LDP)s in place across Wales, which set out proposals and policies for future development and land use it is identified that there is a need for this type of housing in rural communities.¹²⁸ It is recognised by Architect David Lea and others that there is a need to find design solutions to housing in rural areas and on the edge of settlements, as an alternative to housing estates that are dominating our landscape.¹²⁹ Phil Roberts similarly argues against the use of standard pattern book house types. The design study aims to find an alternative solution to affordable housing needs from the development of autonomous, pattern book housing estates with the objective of retaining a connection with local traditions.

The design study will utilise and test the guiding principles from the re-evaluated model to inform the design as a reinterpretation of the vernacular, which is responsive to place. The final design is carried out in order to further refine the model and draw conclusions of its application and relevancy for contemporary design.

A brief is established and a site identified, working to a modest budget and adopting constraints and regulations that affect new building to test the application of the model. Both the brief and site are typical of current housing situations and needs. It was also developed with guidance from Phil Roberts who has expertise in social housing in Wales and acted as a client for the project.

7.4.2 Brief

A brief for a housing group of five dwellings was established alongside the identification of a site which is in the Local Development Plan (LDP) for the Brecon Beacons National Park Authority (BBNPA). The brief for the scheme includes a housing mix of 2, 3 and 4 bedroom houses with parking, comprising 1 x 2 bed, 3 x 3 bed, 1 x 4 bed. Each house is also to include a separate home office space, which is critical in the rural position of the site. The suitability of the brief in relation to the site was established through feasibility studies and from the guidance of Phil Roberts. It was also compared against existing planning permission to develop the whole site, which gained planning permission in April 2008 for the construction of 14 residential dwellings - 2 x 1 Bedroom flats (affordable); 2 x 2 Bedroom houses (affordable); 4 x 3 Bedroom dwellings; 6 x 5 Bedroom dwellings (Reserved Matters).

¹²⁸ Brecon Beacons National Park <<http://www.breconbeacons.org/the-authority/planning/strategy-and-policy/what-is-a-development-plan>> [accessed 3 December 2012]

¹²⁹ David Lea interview

Through discussions with Phil Roberts it was decided that the group of dwellings at the edge of a settlement would be designed as part of a housing co-operative. This was determined as it would allow greater exploration of principles referenced from tradition, that otherwise would be restricted if designed for social housing. The brief still allows for affordable housing but with the opportunity for greater occupant participation in the build and communal living aspects of the scheme. The budget was set at a typical costing for social housing of £1150 – 1250 per m².

Design standards to be referred to include, DQR (Development Quality Requirements), Lifetime Homes, Housing Sight and Code for Sustainable Homes. These are used as references because social housing in Wales is required to meet these standards. The London Housing Design Guide is also used as it includes the regulations above, resolving conflicts between them to make guidance much simpler. The standards will be used as guidance and not be adhered to if there is a better solution. Where it is considered that standards can be improved, the reasoning for not adhering to them will be justified.

The development aims for Code for Sustainable Homes level 4+ as level 4 requires some forms of low/zero carbon technologies in addition to fabric improvements, whereas Code levels 5 and 6 are dominated by these which would add to costs. The use of passive design principles, where possible, over high tech solutions is aspired to. The scheme aims to be a self sufficient community, with allotment gardens and a community centre for the village community to share.

7.4.3 Site

The site for the group of houses is in Llanvihangel Crucorney, Monmouthshire and has been identified as part of the Local Development Plan (LDP) for the Brecon Beacons National Park Authority (BBNPA). It is a level 3 settlement – ‘These are settlements which have the environmental capacity to accommodate appropriately scaled development. Within these settlements the focus will be on enabling residential development, small scale employment opportunities or community facilities which would support the vitality and viability of the area. These places are listed as settlements within the LDP either because they have been defined as sustainable locations and/or there is a community defined need for development to support socio-economic sustainability.’¹³⁰ The site is therefore appropriate for development and there is an imperative to do so.



Fig. 7.82 Llanvihangel Crucorney, Monmouthshire, Wales

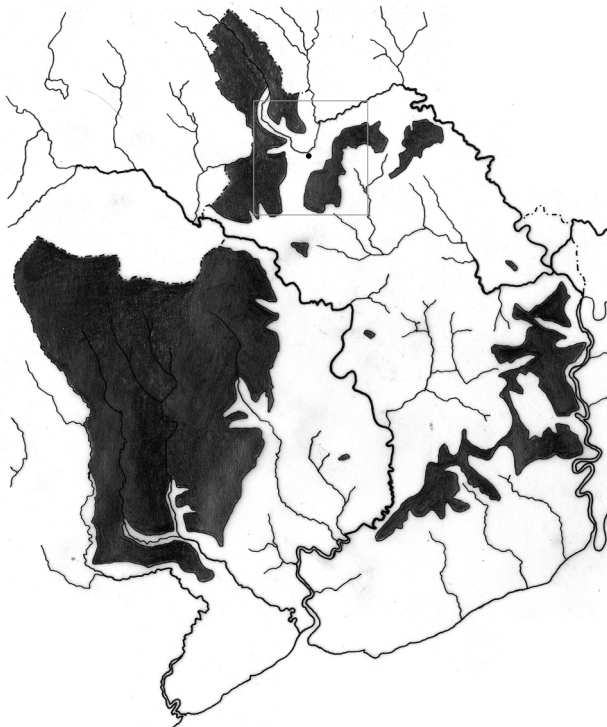


Fig. 7.83 Location of Llanvihangel Crucorney in Monmouthshire in relation to high ground and rivers

¹³⁰ Brecon Beacons National Park, *Authority Draft Deposit Local Development Plan* <<http://www.beacons-mpa.gov.uk/the-authority/planning/strategy-and-policy/submit-local-development-plan>> [accessed 3 December 2012]

7.4.4 Design approach and principles

- Connection with the landscape and site

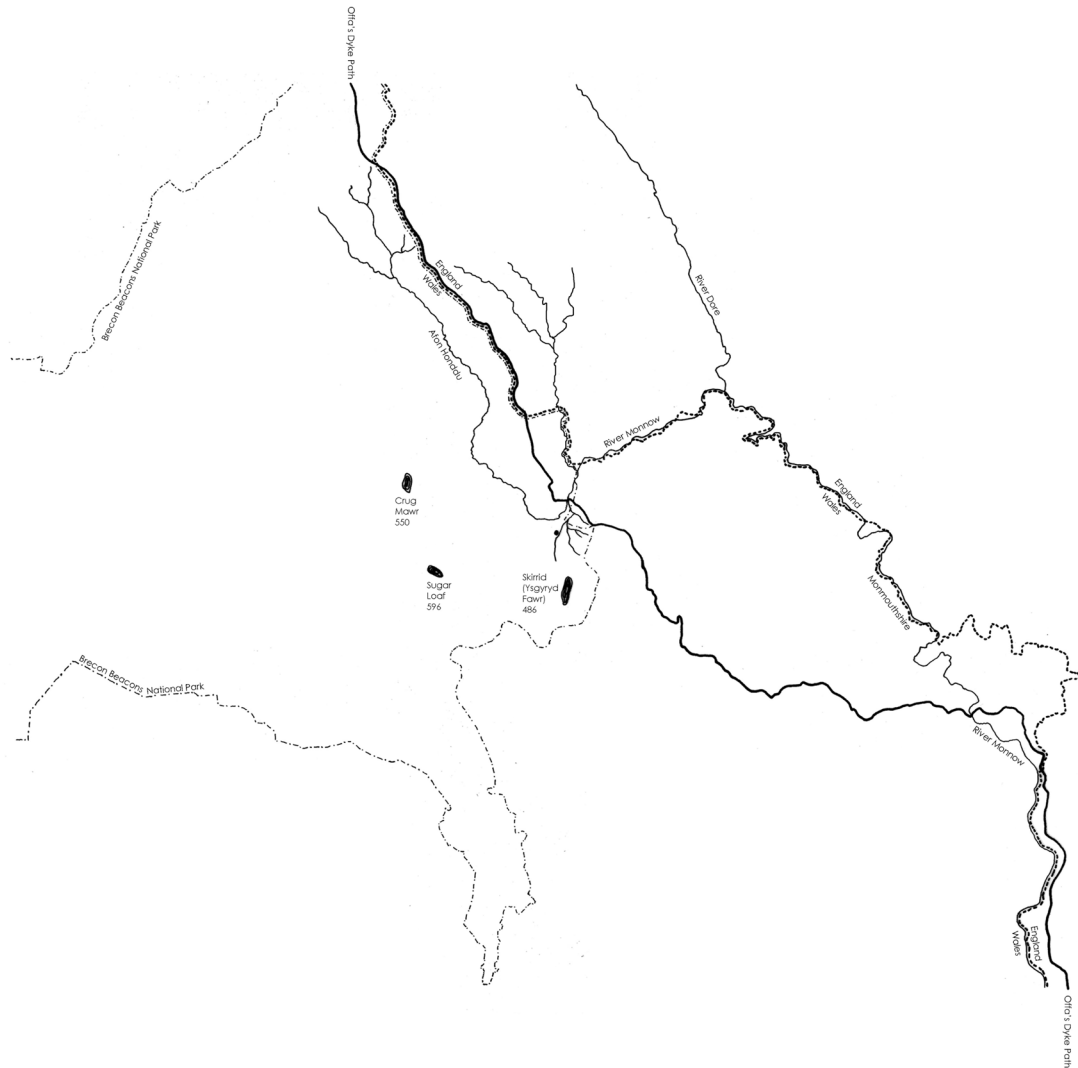


Fig. 7.84 Mapping of the wider context of site to illustrate the relationship and convergence of important geographical features including rivers, paths and peaks and historic borders to the site



Fig. 7.85 Rubbings of a physical model showing the relief and contour patterns of the landscape, to understand the topography of the site within the wider context



Fig. 7.86 Field and settlement patterns of Llanvihangel Crucorney and the surroundings is drawn to recognise the relation between settlement and land use in the wider context



Fig. 7.87 Long sections through site facing towards the south-west and the south-east, analysed to identify the significant land forms and particularly the relationship between Skirrid Fawr and the site



Fig. 7.88 Section drawn through the site showing the old road through the village and the new road bypassing it, it demonstrates the gradient of the site and its relation to the adjacent buildings



Fig. 7.89 Site photos taken to illustrate the character of the place

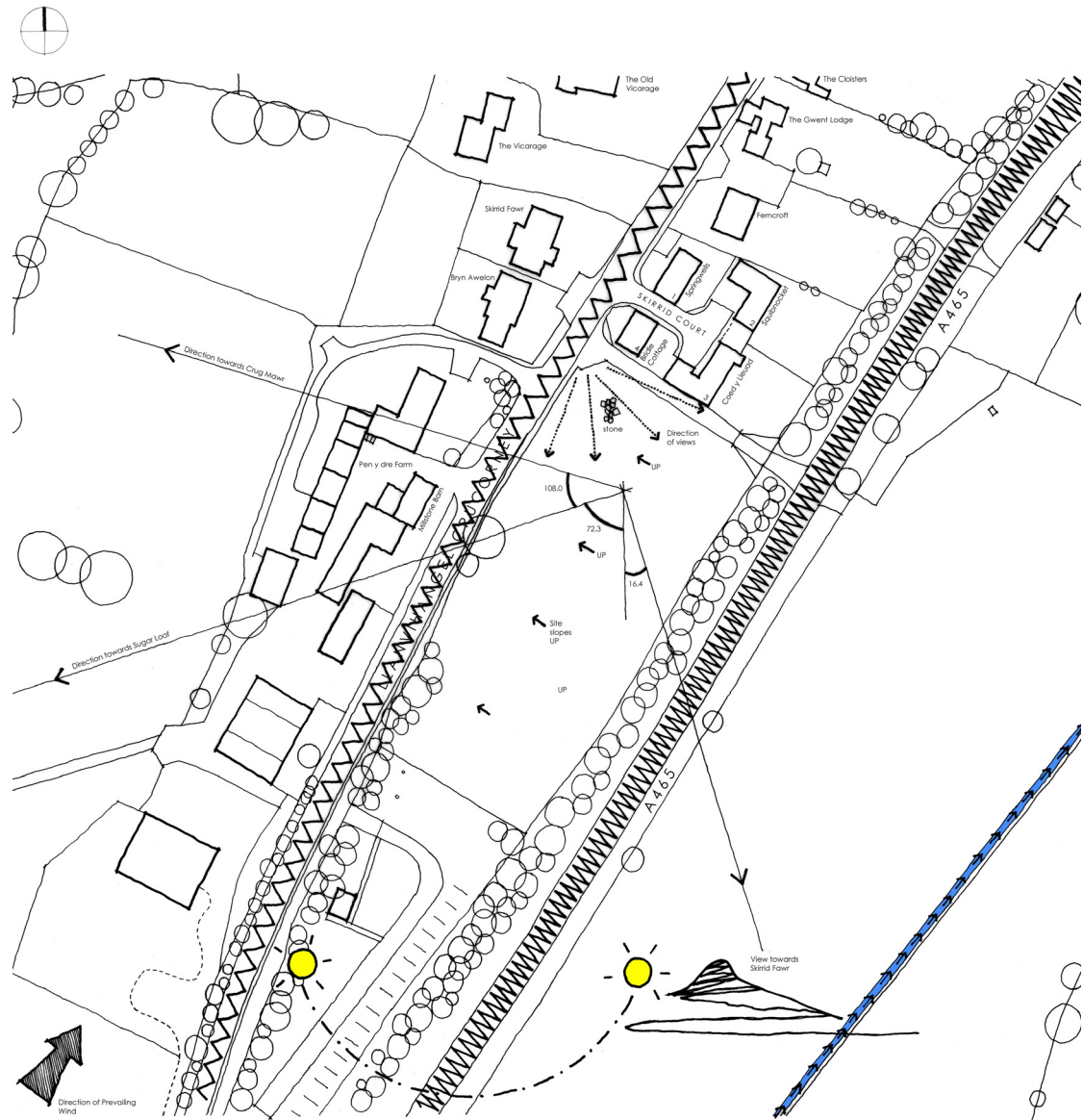


Fig 7.90 A site analysis diagram shows the sun path and direction of prevailing winds, the relationship of the site to surrounding landscape peaks and features including the direction of the view to Skirid Fawr, the slope of the site, noise levels from the roads, significant trees and vegetation and surrounding built form, roads, paths and field boundaries 1:2000

Linear settlement of Llanvihangel Crucorney

Llanvihangel Crucorney has developed along a main road within the valley as a linear settlement. Settlements along a line usually develop in this way due to growth of a town restricted by mountains, hills, valleys or rivers. Linear settlements are also found along roads as this settlement is, however a new road has been built to the south of the village. Within the village, the farmstead Pen y Dre (opposite the site) has its own settlement layout. The cluster of buildings built at various times is formed predominantly by buildings arranged parallel to the road and settlement of Llanvihangel Crucorney. Small courtyards are created within the spaces between buildings.

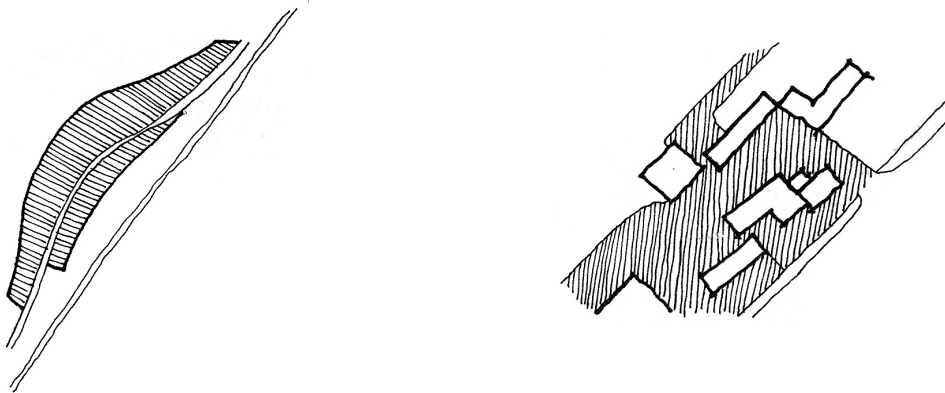


Fig. 7.91 Linear settlement of Llanvihangel Crucorney showing how the village has developed in relation to landscape feature of the plan; Fig. 7.92 Pen y Dre Farm showing how linear forms have created a courtyard

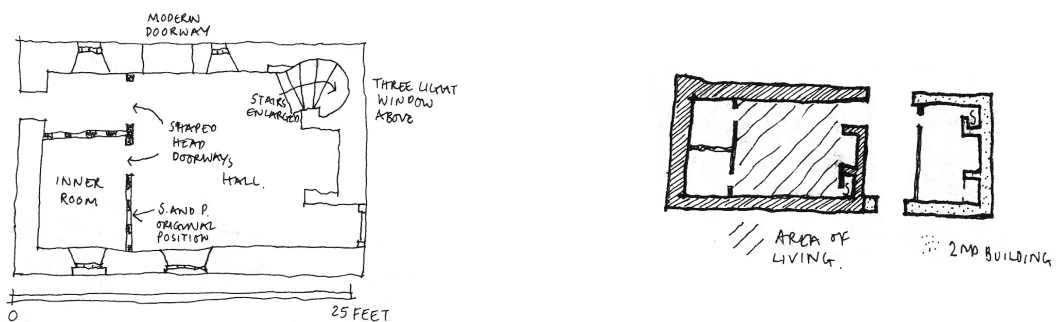


Fig. 7.93 Vernacular Cottages in Llanvihangel Crucorney Bridge Cottage – regular two room plan; Fig. 7.94 Lower Stanton – modified hall house layout, three rooms with cross passage and later third room addition, identified to study the character of the vernacular specific to this region and place

A study of different housing layouts are considered and compared in relation to their feasibility on the site.

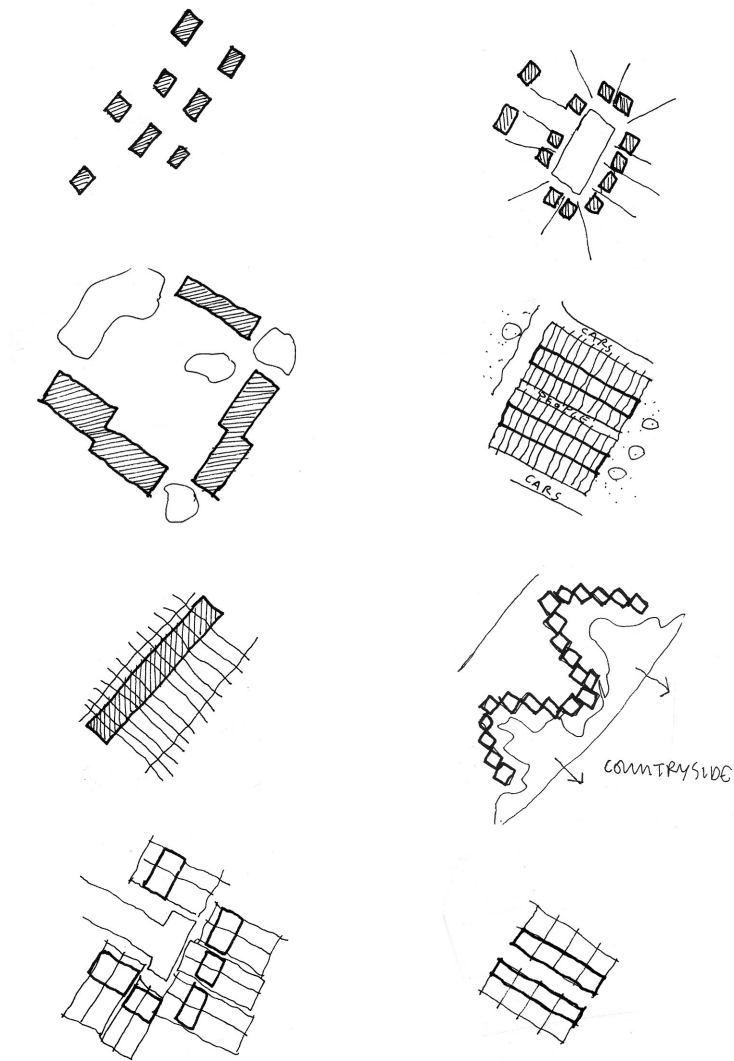


Fig. 7.95 (From left down and then right down) Informal cluster; Formal cluster (courtyard); East-west Terrace (climatic response); Suburban semi-detached (formal around crescent or court) Garden village; Radburn layout (house fronts face pedestrian/ green zone and parking to rear); Perimeter housing; Mews (Parking on ground floor with accommodation above)

A study of variations of farm building layouts

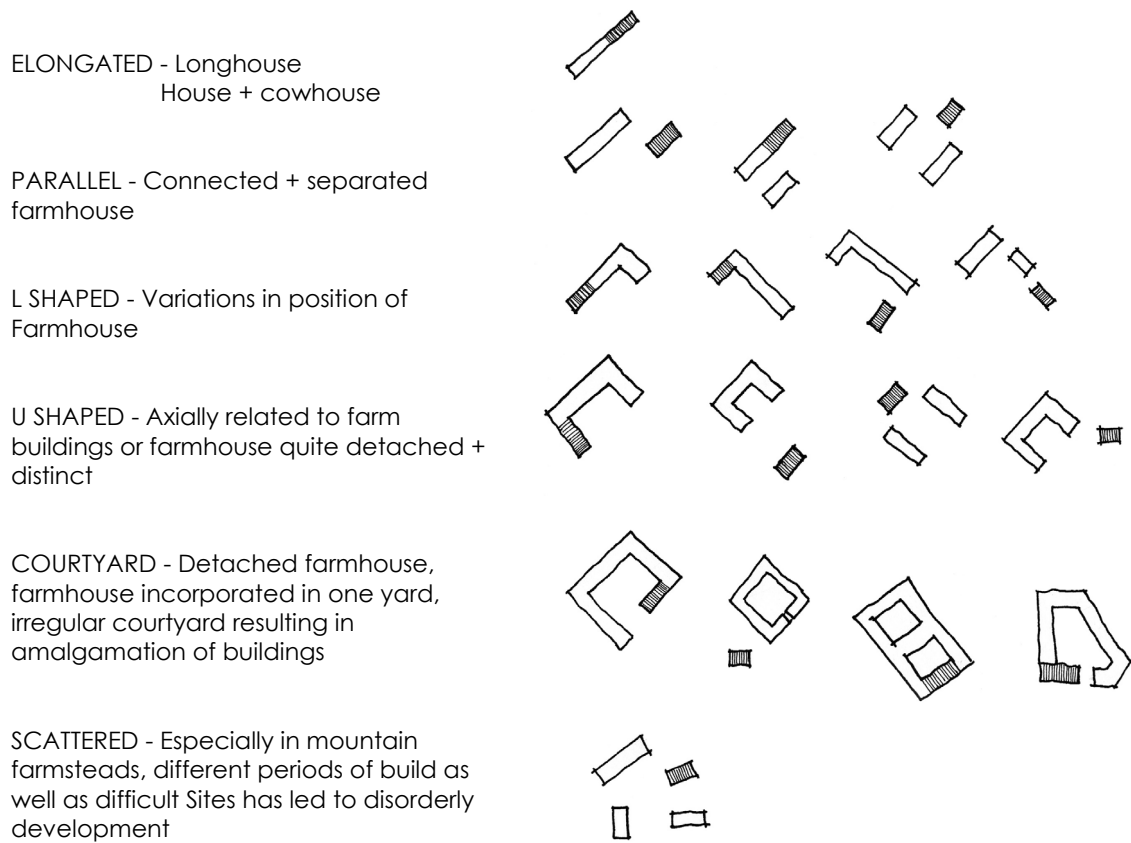


Fig. 7.96 Study of farm building layouts taken from R. W. Brunskill's *Illustrated Handbook of Vernacular Architecture* to analyse traditional settlement configurations in England and Wales

A study of courtyard house typologies

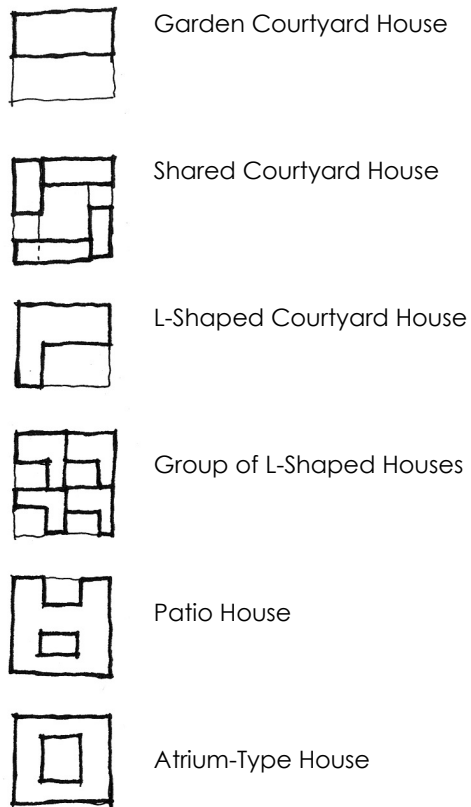


Fig. 7.97 Study of contemporary courtyard typologies taken from *Courtyard Houses: a housing typology* by Gunter Pfeifer

Initial design studies

A number of design objectives are identified from earlier studies as follows:

Courtyard houses within a formal court

Formal cluster of buildings to a similar scale layout of surrounding farm buildings

Entrances overlook for security

Shared parking court away from front of houses

Semi private front gardens and private gardens in courtyards

Communal squared garden and communal allotment gardens

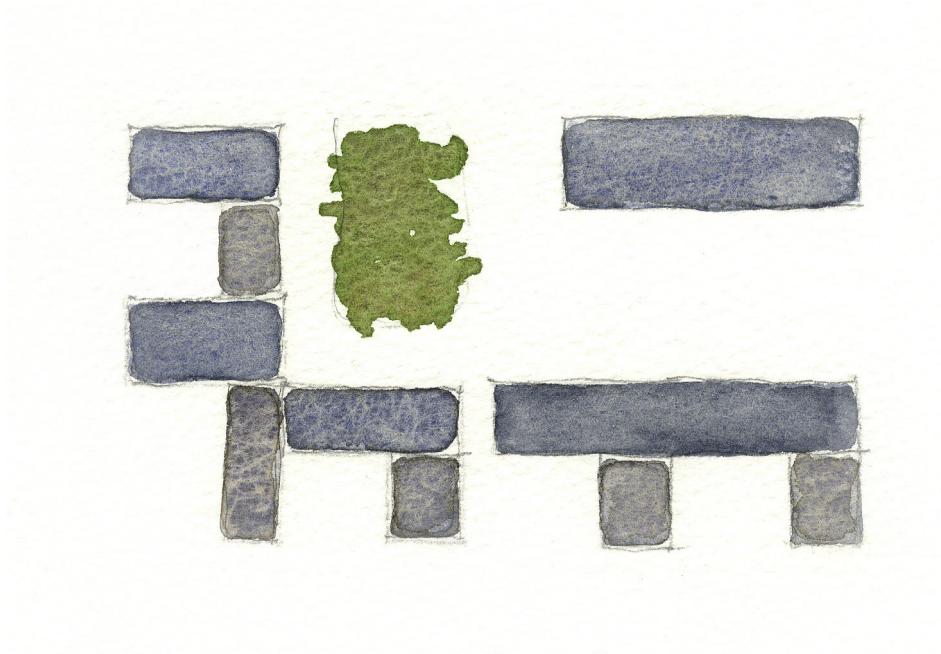


Fig. 7.98 Concept study of courtyard arrangement

Initial layout study



Fig. 7.99 Housing mix of 1 x 2 bed, 3 x 3 bed and 1 x 4 bed determined in a feasibility study of site and guidance by Phil Roberts from his knowledge of affordable housing needs

Initial massing studies

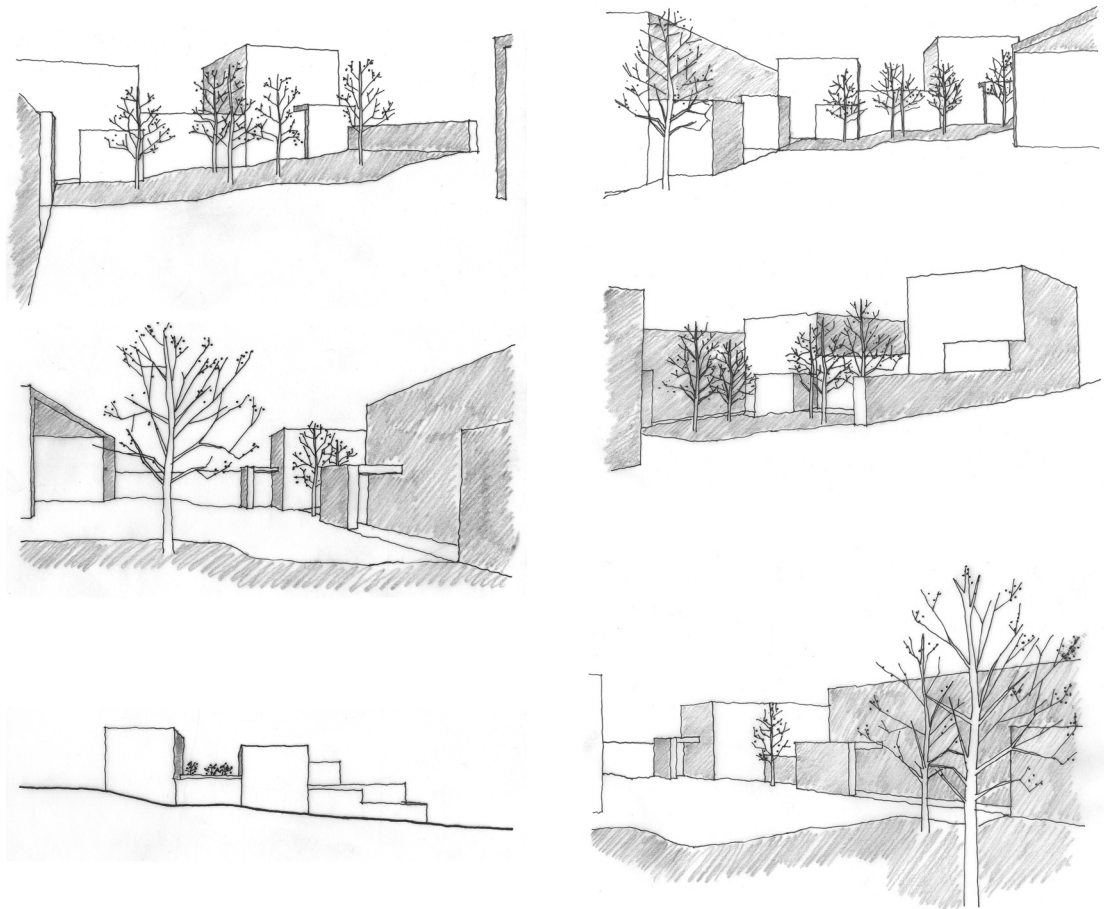


Fig. 7.100 Initial perspectives of public court where flat roofs were firstly proposed

Variations of housing layouts

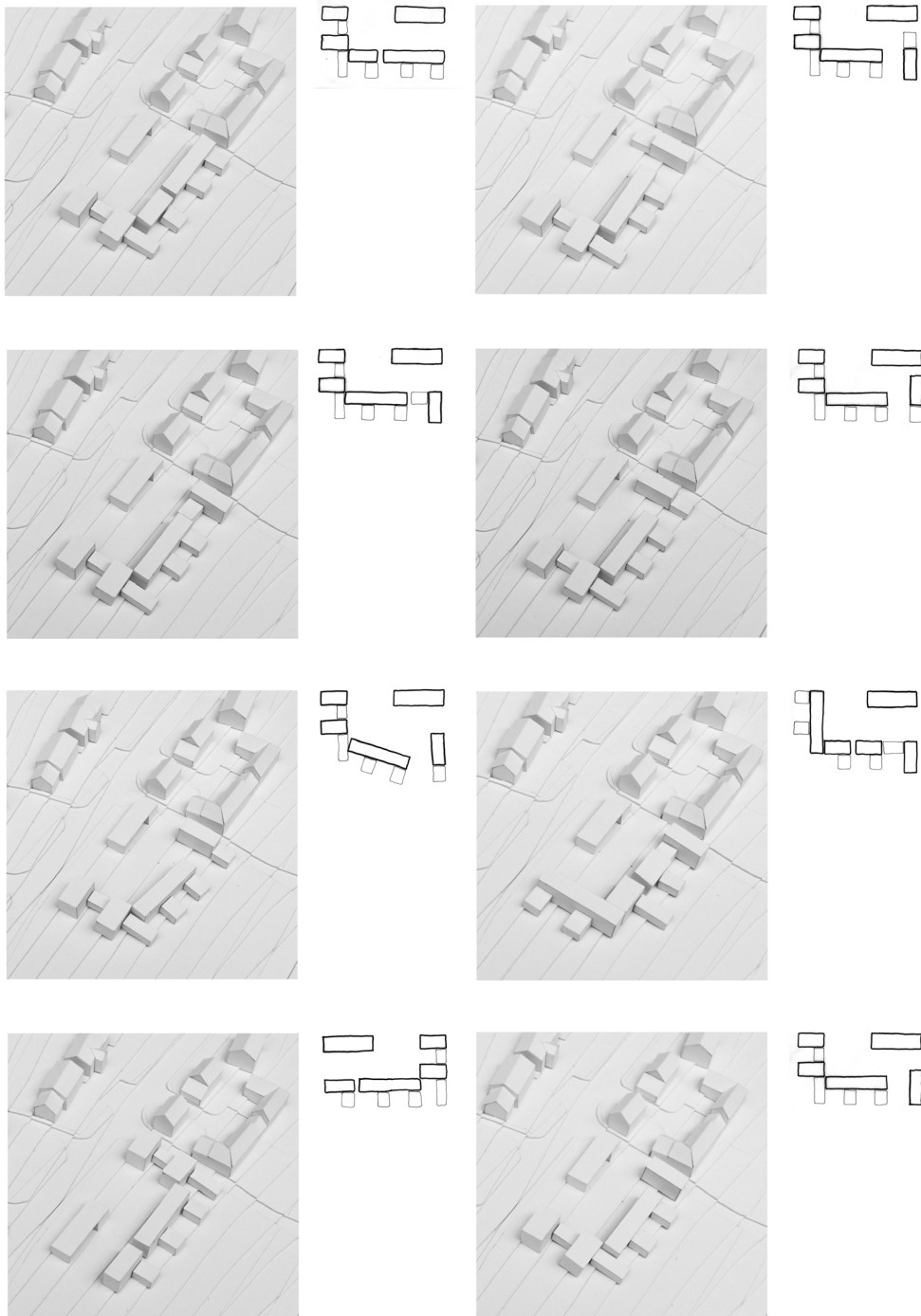


Fig. 7.101 Studies of variations in possible housing types are analysed on a site model and tested against the grain of the surrounding built forms. Principle elements of the forms run parallel to the road and village, with lighter elements at right angles, positioned down the slope of the site, creating courtyard spaces to each dwelling. The rectilinear arrangement is more successful than the organic layout, as is the more enclosed courtyard form and arrangement.

Initial design studies of proposed layout

Courtyards south facing

Living spaces open on to courtyard with direct views of Skirrid Fawr

Hearth is the focus of the home

Home office situated within houses but with own access off courtyard in a number of the house types

Bedrooms situated in second storey linear elements of the houses.

Private courtyards open onto communal gardens

Bin and bike stores to the front of houses

Kitchens overlook public court for security

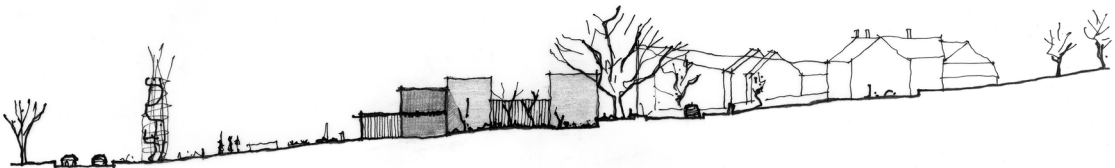
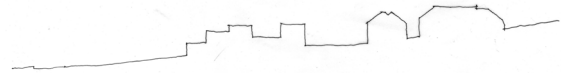


Fig. 7.102 Proposed design layout; Massing in village context; Fig. 7.103 Studies of form in the landscape - form relates to landscape of site and follows topography of the ground

Principles behind arrangement of house forms and rationale of siting

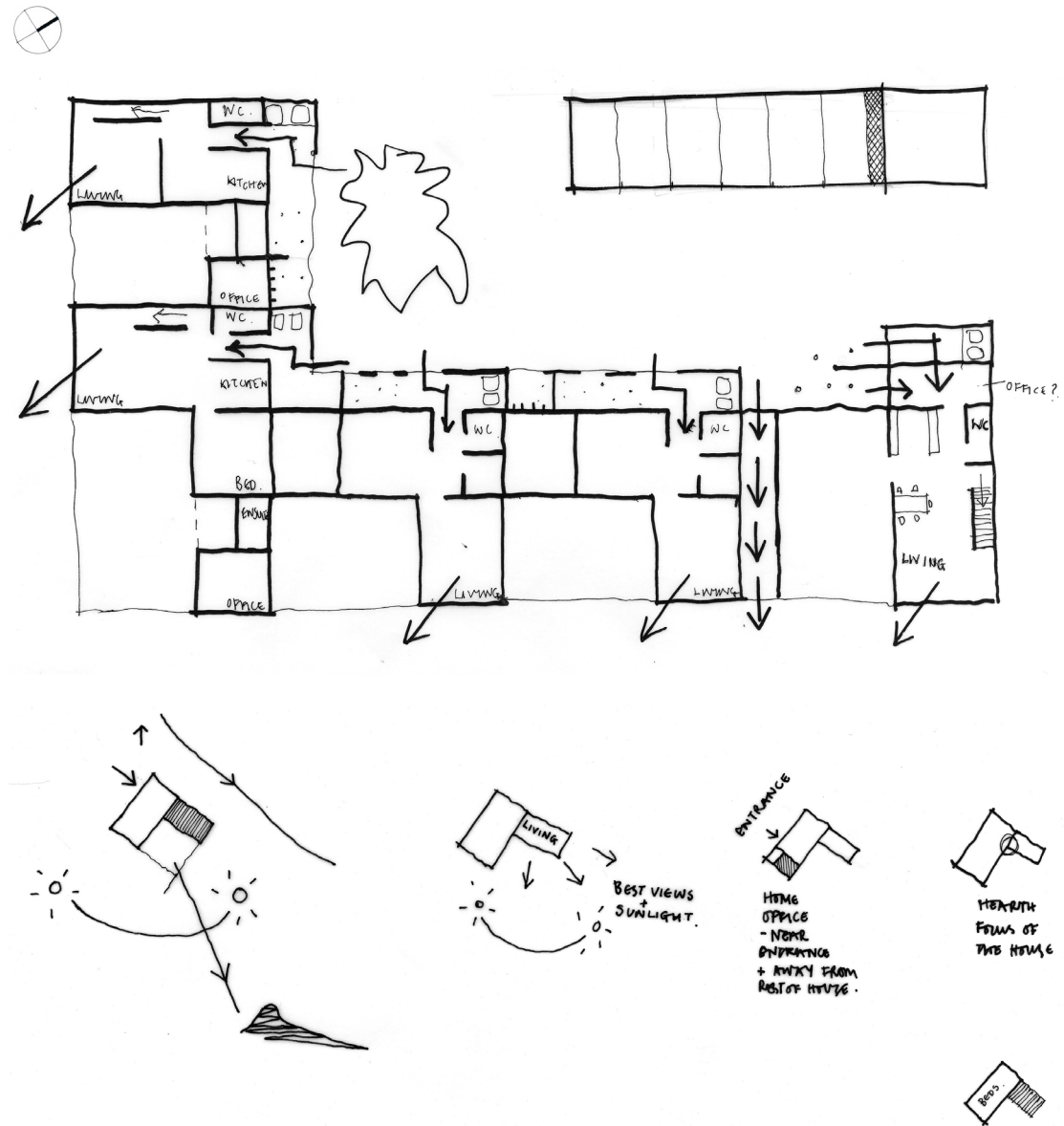
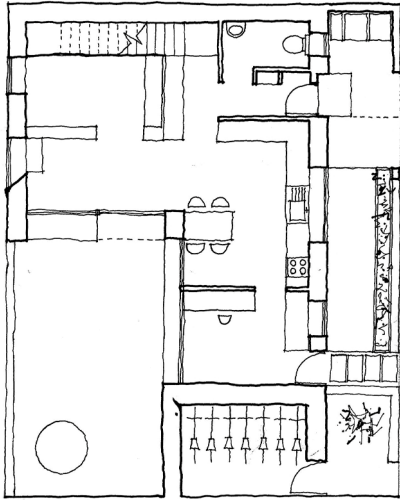
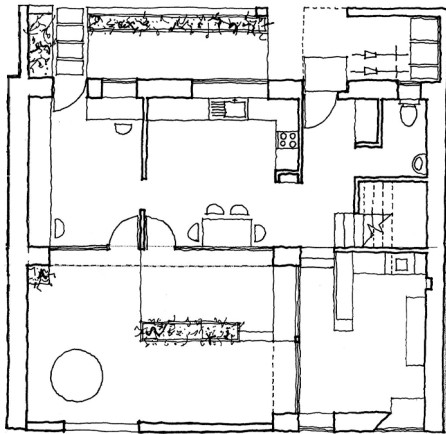


Fig. 7.104 Orientation, views, home office, hearth at core of house

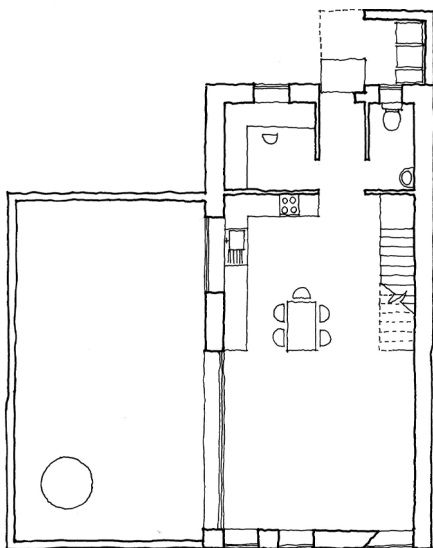
House types



2 bed house type (2b4p) – 2 storey
81 m² + office space 8 m²
(London Design Guide min. 83 m²)



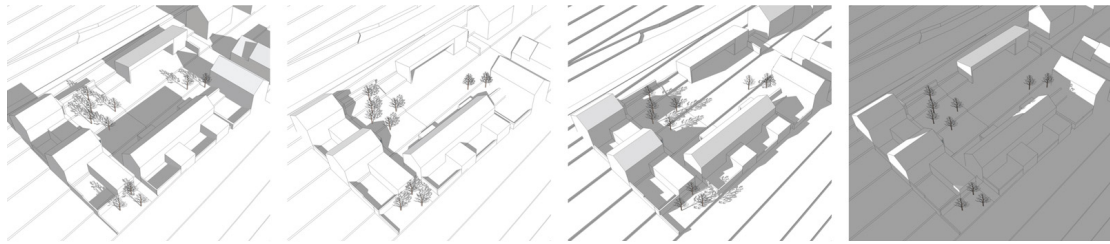
3 bed house type (3b4p) – 2 storey
86 m² + office space 12 m²
(London Design Guide min. 86 m²)



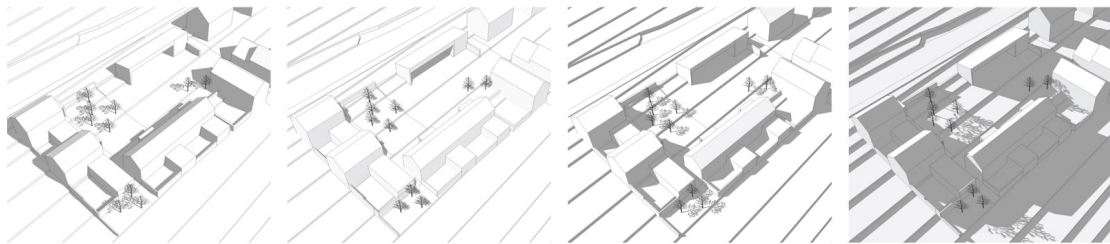
4 bed house type (4b6p) – 2 storey
109 m² + office space 6 m²
(London Design Guide min. 107 m²)

Fig. 7.105 House types are compact in size but there is flexibility in the open plan living and potential use of office space for other activities. The house types show repetition in of elements.

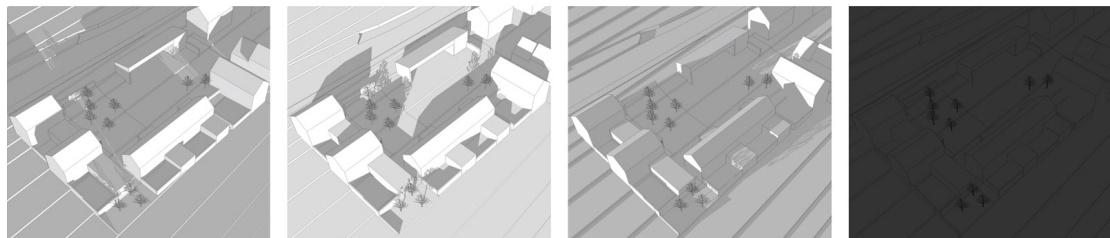
Daylight studies



March 21 9:00, 12:00, 15:00, 18:00



June 21 9:00, 12:00, 15:00, 18:00



December 21 9:00, 12:00, 15:00, 18:00

Fig. 7.106 The day lighting studies show that for the majority of the year the private south facing courtyards receive good levels of sunlight

Light

Diverse qualities and quantities of light created within spaces. Awareness of seasons and time as light fills rooms of the houses in different ways throughout the day and throughout the year.

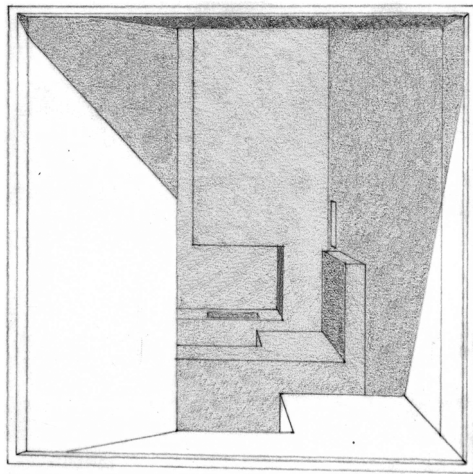


Fig. 7.107 Lighting study of splayed window seat. Window seat is filled with sunlight in the morning throughout the year. The study shows the lighting at 10:00 in May.

Views out to the landscape

Skirrid Fawr (ysgyrd fawr) – also known as holy mountain or sacred hill is a marker of the place and stands out in the surroundings. It is a distinctive shape with a long ridge orientated nearly north – south, with a jagged western side resulting from ice age landslips. Ysgyrd is a word describing the hill's shape, signifying that it has shivered or been shattered. There is rich mythology attached to the mountain, also known as Devil's table. According to legend, part of the mountain is said to have been broken off at the moment of the crucifixion of Jesus. There was a local tradition that earth from the Skirrid was holy and especially fertile, and it was taken away to be scattered on fields elsewhere, on coffins, and in the foundations of churches.

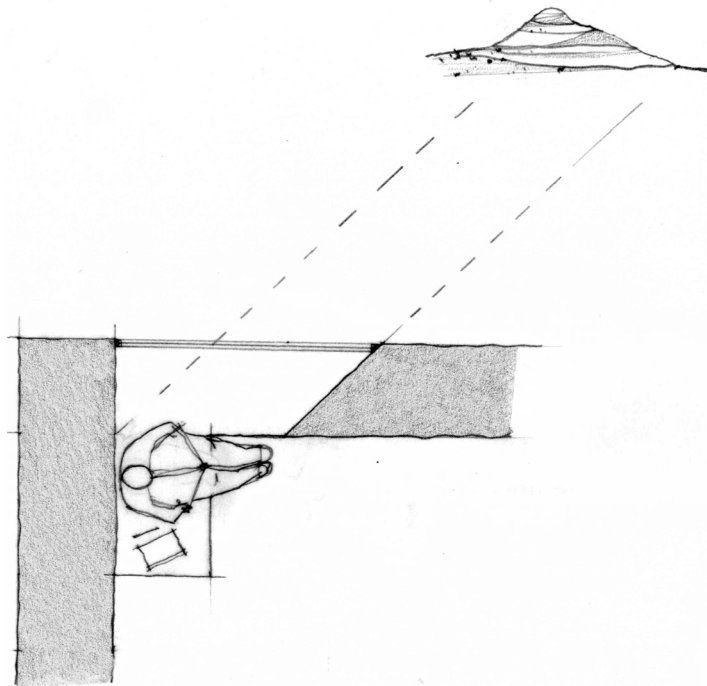


Fig. 7.108 Views out to the Skirrid from the splayed window seat provide a connection with built form and place. The window frames and control views of the surroundings. The distant view is of the skirrid, whereas an intermediate view is of the communal allotments. The opening is splayed to give a view of the mountain and also to provide privacy to the living space and create an intimate place to sit.

Inside and out

In the living space smaller windows open out on to the communal allotment gardens providing greater privacy and framing views of the wider landscape and Skirrid Fawr. The sunlight enters through these windows in the morning and moves round during the day to penetrate through the primary façade which has large openings that open onto a private courtyard. Here there is a greater connection between inside and outside enabled through the creation of a more secluded courtyard garden.

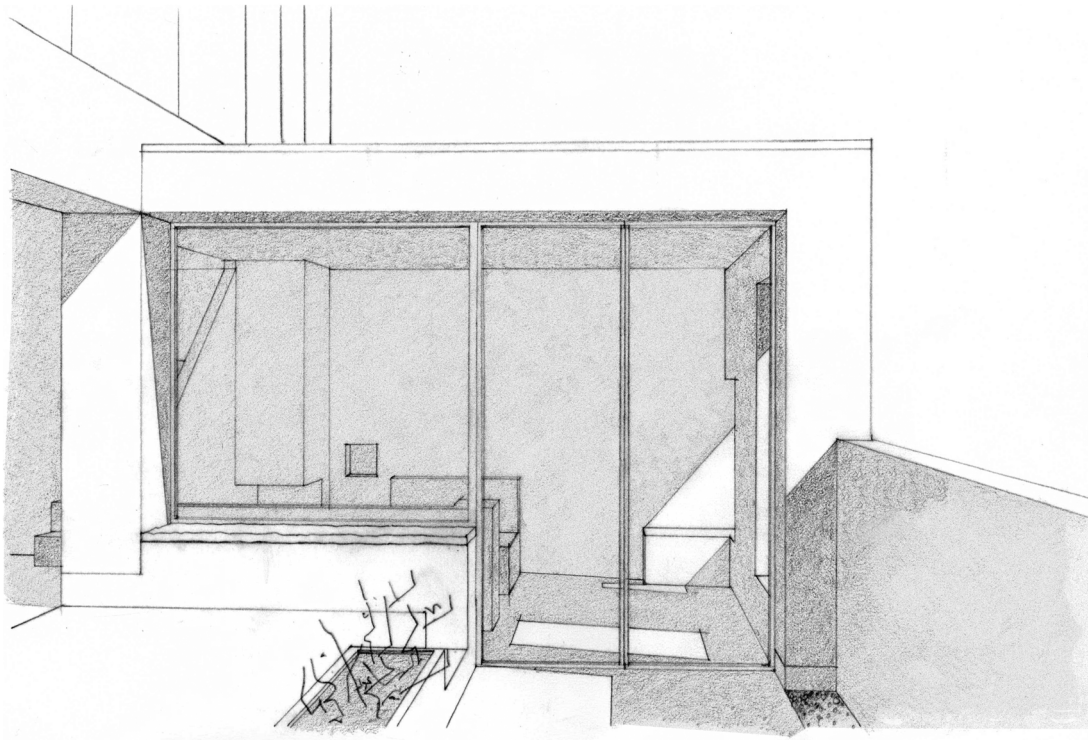


Fig.7.109 Deep reveals lessen solar gains and a sheltered ledge in the window reveal provides a place to sit in the sunshine.

- **Simplicity of form and construction**

Studies of simplicity of form, externally and internally

Following initial massing studies of form in the context of the site, it was decided that the primary forms would comprise pitched roofs as they would benefit from the provision of additional space for storage and the opportunity for space to be opened up into the roof. The houses are less simple and stripped back with pitched roofs, however the form fits into the context of the place with pitched roofs and it was argued by the client Phil Roberts for the design study that the scheme would not gain planning permission with flat roofs. The outshot forms to the rear and the porches to the fronts of the houses are however of simple flat roof cuboid protrusions.

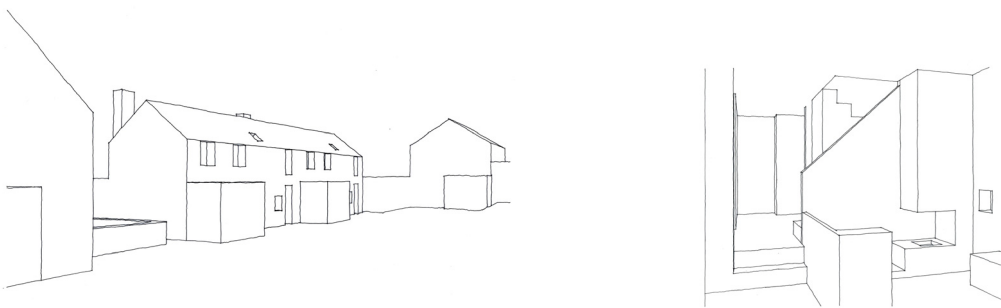


Fig. 7.110 Sketch studies of simple forms in perspective of communal courtyard; Fig. 7.111 Interior perspective of living room with hearth in 3 bed house type

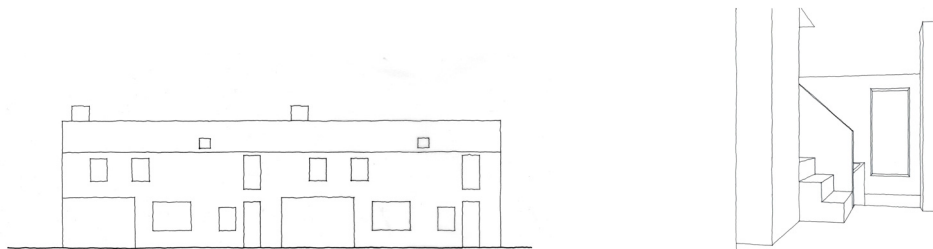


Fig. 7.112 North elevation with simple openings and protrusions; Fig. 7.113 Interior perspective view looking through to living room of 3 bed house type

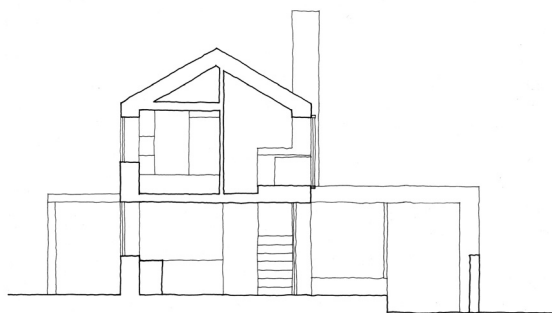


Fig. 7.114 Section through 3 bed house type

A number of materials are considered for construction because of their properties connected to building simply. These are as follows:

Concrete

Concrete performs a multitude of roles simultaneously, possessing load-bearing capacity, insulating capabilities, potential to store thermal mass and the ability to provide protection from the elements. It provides an immediate separation from inside and out.

There is opportunity for flexibility in design and the size of openings are unrestricted as reinforcement and pre-stressed elements can be integrated into the concrete structure. These elements that strengthen concrete are concealed within the construction, meaning there is a consistency of material visible to the exterior and the structure appears as a single unit. Building services can be embedded within the concrete reducing the visible components of the building to its essential elements.

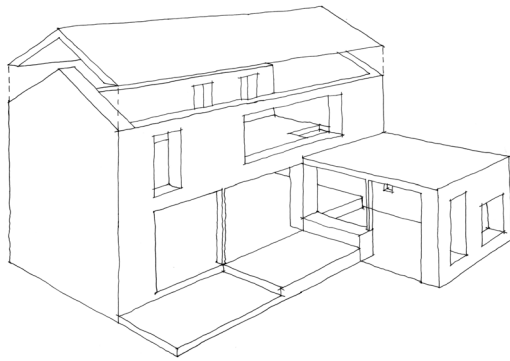


Fig. 7.115 Study of 3 bed house type using cast in-situ concrete. The massiveness and solidity of concrete, anchors the form to the ground and its place. Its appearance is durable and lasting.

The house in Chur at the foot of Montalin in Switzerland designed by architect Patrick Gartmann is built principally of a substantial mass of insulating concrete. The concrete functions structurally, and is thermally insulating and climate regulating. It is left in its raw state, exposed both internally and externally. The monolithic, mono-material enables a simple construction to be possible and creates a unified visual simplicity. The material characteristics of the concrete are expressed in the heavy, solid construction.



Fig. 7.116 Simple monolithic elevation of House in Chur using cast in-situ concrete

The walls of insulating concrete are 450mm thick, giving a U-value of 0.58 W/m²K. The roof is constructed of a 600mm concrete slab of U value 0.40 W/m²K. A light-weight aggregate of expanded clay and aerated ground glass is used in the concrete, which increases the porosity and insulation capacity of the concrete. This reduces the load-bearing strength of the concrete but creates a homogenous surface with fine pores.

Although this construction was possible in Switzerland, under building regulations in the U.K. this construction would not be achievable without building exceedingly thick walls to reach the U-value required of 0.30 W/m²K (Building Regulations Part L1 2010). This value is expected to be lowered to 0.18 W/m²K for walls and 0.11 W/m²K for the roof by 2016 making it even more unattainable to build by casting a single depth of in-situ concrete.

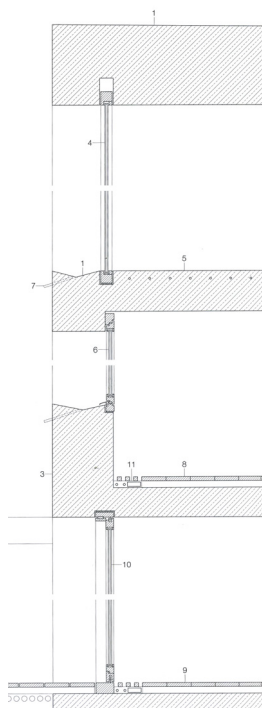


Fig. 7.117 Construction section of single leaf of cast in-situ concrete at the house in Chur; Simple monolithic elevation of cast in-situ concrete

Misapor, a concrete manufacturer in Switzerland has developed a new MisaporConcrete core insulating system (CI system), which can achieve a similar aesthetic of exposed concrete both inside and out, as at the house in Chur. However, hidden within the cast concrete is an insulating core. With minimal extra effort than casting a single homogenous mass of concrete, the thickness of walls can be reduced to 440mm to achieve a U-value of 0.15 W/m²K and thermal bridges are diminished.

In order to achieve this, the chosen external formwork is assembled in place, along with doors, windows and fixtures positioned and installed. Tongue and groove insulation panels are fitted together and positioned in place between the shuttering, using thermo pins to connect the

two formworks together. The binding points of the formwork should be added continuously as the insulation is installed. Assembly of the reinforcement of the inner supporting formwork can then be carried out and the concrete poured.

The increased complexity of adding insulation to the structure has made it necessary for more elements to make up the wall construction. The construction has become much less simple and pure, but there still remains an impression of the structure being a single monolithic block of concrete. The increased thermal performance of this system could have made it a feasible building technique to use in the U.K., but the MisaporConcrete is only licensed in Switzerland at present.

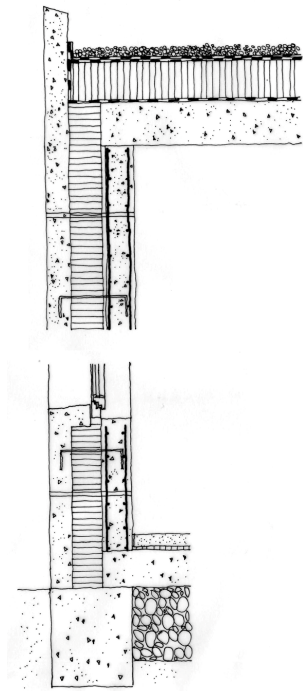


Fig. 7.118 Construction section highlighting the added complexity to achieve a lower U-value in the MisaporConcrete core insulating system

Stone

It is not an option to build with stone or masonry alone today without the use of an insulating material. Fewer quarries remain open in the U.K. and costs of local stone are high. Cheaper stone is imported from various countries around the world such as India, China, Brazil etc., but prices are still high compared to other building materials. The high costs have also meant that it is not practical to use stone to construct thick monolithic walls. This has led to stone only being cut to a minimal thickness often only a few centimetres and used merely as a cladding material.

In a quest to use stone in a more authentic way, the thickness of the cladding is increased to that of a facing wall and built similarly to a double leaf masonry wall. This however increases costs. Artificial masonry is also produced as a cheap alternative but lacks the textural quality of natural stone. Where masonry is used as an external facing wall, an air space is normally required, followed by insulation and an inner structural leaf which is usually plastered. The cladding needs expansion joints, ventilation and drainage openings, fragile wall ties and horizontal support brackets making the whole wall system extremely complex. The quality and character of the masonry as a solid and durable construction material is lost.



Fig. 7.119 Study of 3 bed house type with stone cladding

Using stone as a protective cladding layer goes against the materials load-bearing capabilities. It reduces the material to being able to carry out a single function in conjunction with a number of other materials. Using the material in this way does not take advantage varied inherent properties of stone and doesn't correspond with traditional building techniques.

In an attempt to build in the true load-bearing nature of stone, Herzog & de Meuron built with rubble filled gabion walls at the Dominus Winery, Napa Valley, USA. At the Casa de Piedra in Tavole, France, the same architects infill a concrete frame with dry stone walling. The concrete structure is exposed and despite the stone being used solely as an aesthetic cladding it pushes the stones capabilities in a dry construction and requires skilled craftsmanship to build. The construction would however not comply with current requirements in the U.K. as the structure is not wrapped continuously in an insulating material. Where concrete is revealed on the exterior there is thermal discontinuity and unsatisfactory cold bridging.

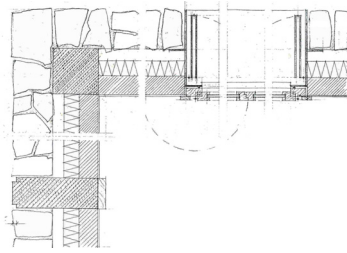


Fig. 7.120 Casa de Piedra at Tavole by Herzog & de Meuron; Fig. 7.121 Detail of wall construction - concrete structure with dry stone wall infill

In trying to design in the spirit of this house following today's regulations there were difficulties in being able to expose the nature of the structure externally without there being cold bridging. In trying to resolve this, the construction gained complexity as more materials were required to compensate for inefficiencies in others and the design of the building lost its simplicity. It may be possible to achieve however on a small scale, single storey building where insulation can be wrapped internally.

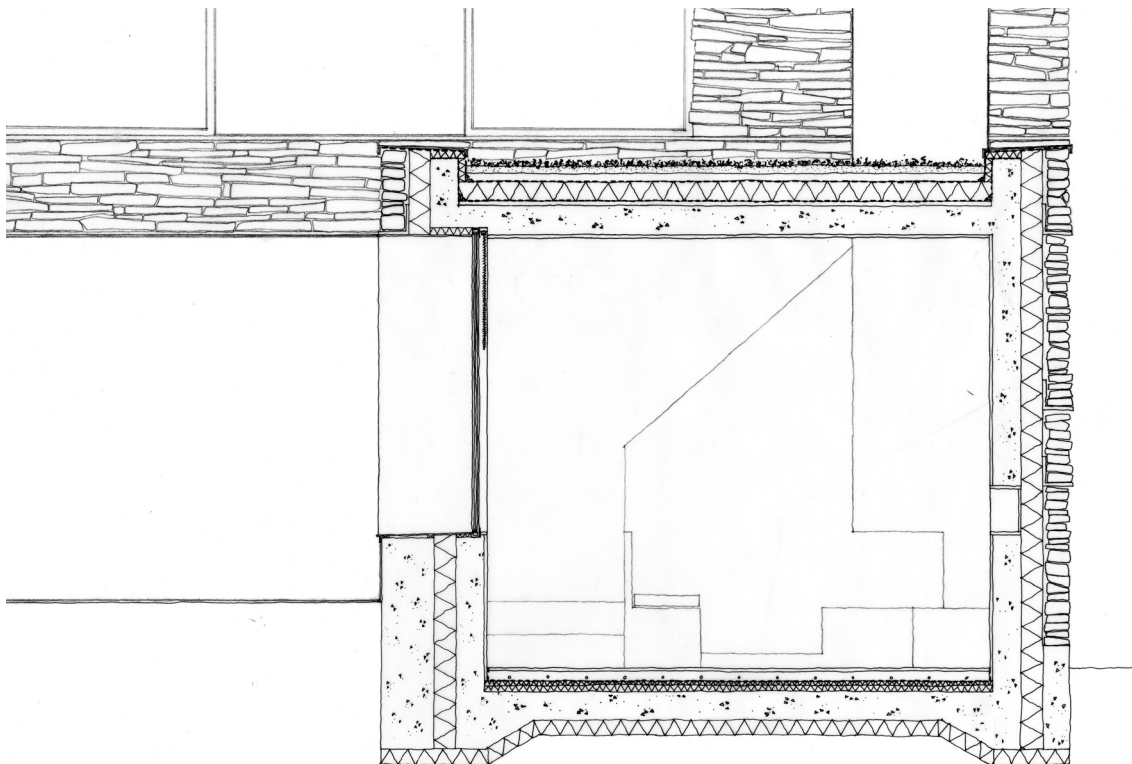


Fig. 7.122 An attempt at detailing construction of the 3 bed house type with an in situ concrete structure and a dry stone wall cladding. The method of building became complex in compensating for cold bridging.

Cross laminated timber panels

Cross laminated timber (CLT) panels are factory produced from mechanically dried spruce boards, which are stacked together and glued at right angles over the whole surface. Depending on the structural loading required the panels can be 3 to 9 boards thick. The boards are glued at high pressure, which reduces the timbers expansion and shrinkage potential to a negligible level. The rigid structural panel can be used either vertically or horizontally.

Load-bearing panels are assembled and joined to form a "slab tectonic" system.¹ It forms solid planes without the need for non-structural infill panels or floor slabs. The inherent properties of timber are transformed in the production of cross laminated timber panels, and the material's limits extended. Positioning of openings and layout is much less limited and opening of a larger size can be cut almost anywhere, compared to that of traditional timber buildings, where individual load-bearing elements are regularly spaced. The panels form a monolithic, solid construction, not dissimilar to the structural capabilities of masonry or concrete construction and developing a similar robustness. As with concrete, the structural strength of the material is concealed within the construction of the building elements. The material does however retain some of the properties intrinsic to timber.

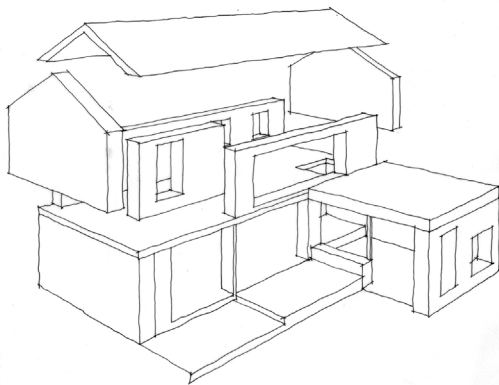


Fig. 7.123 The cross laminated timber panels can be erected in large monolithic pieces of mono-material and can be used as walls, floors and roof structures

Cross-laminated timber is an engineered timber product with good structural properties and low environmental impact, where sustainably sourced timber is used. It can provide dry, fast on-site construction with good potential for airtightness and a robust wall and floor suitable for most finishes internally and externally. It requires only limited new site skills, and its low weight means a high degree of offsite manufacture is possible. Access permitting, relatively large pre-manufactured panels can be transported to site for fast, factory quality construction. Currently, CLT is manufactured abroad with an established supply into the UK market, although this brings a higher environmental impact from typically increased transportation distances and some cost uncertainty with varying foreign exchange rates.

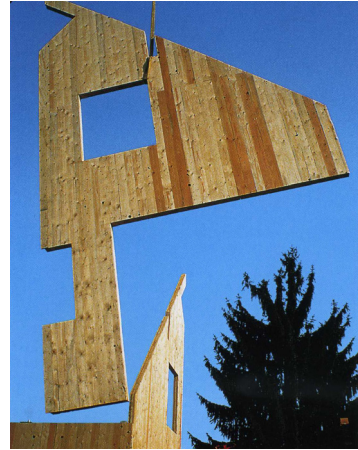
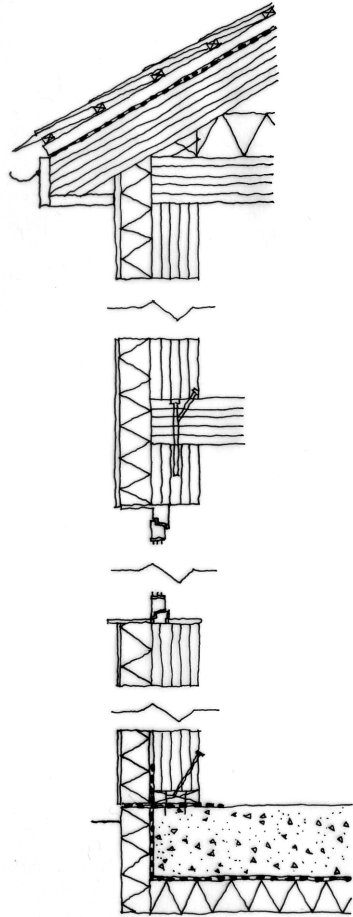


Fig. 7.124 Panel section lifted in place on site

Fig. 7.125 Detail of cross laminated timber panel construction with exterior insulation and applied finish

Hemcrete

In an attempt to break away from the current conventional multi-layered way of building, there is a need to look to material innovations to be able to create simple buildings which comply with building regulations. The use of hemp has been rediscovered as a useful crop and hemp lime is becoming a popular alternative construction method. Hemp lime can be cast to create solid, non load-bearing walls. It is a low carbon building material with good insulation properties and robustness. It is made using renewable, natural 'raw' materials and has the benefit of storing carbon during plant growth and throughout the life of the material.

Hemp lime is usually used as the non-structural external infill to a timber frame and is typically cast in formwork or spray applied against a lining board. The timber frame is encased within the homogenous solid wall construction, which benefits from good insulation properties offering thermal mass, airtightness and minimal thermal bridging. The hemp lime mix is light-weight reducing loads on foundations. Hemp lime regulates the temperature and humidity of a building.

Traditional Hemcrete has a thermal conductivity of 0.06 W/mK giving a U-value of 0.15 at the thickness of 400mm of hemp lime, which is comparable with MisaporConcrete core insulating system. The external surface must be protected with either a render or rain-screened external finish.

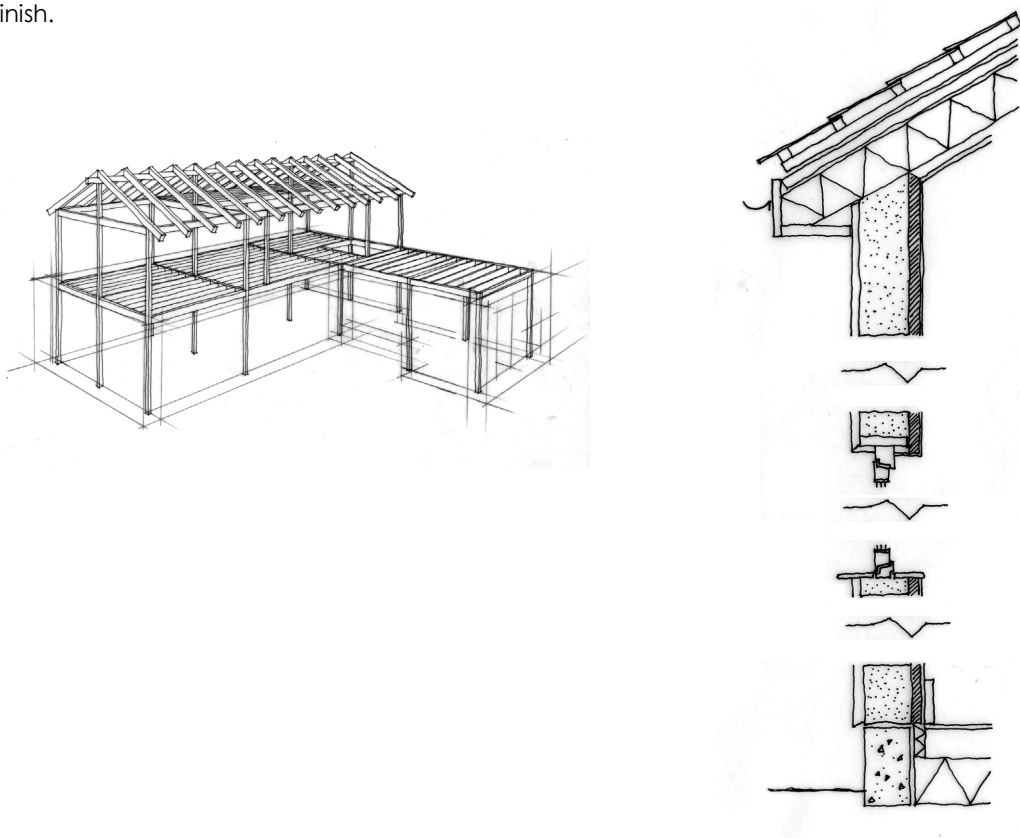


Fig. 7.126 Timber frame with hemcrete cast in-situ to the outer edge of frame; Fig. 7.127 Detail of hemcrete construction with lime render or external cladding, hemcrete with timber frame within and vapour permeable carrier board and lime plaster finish

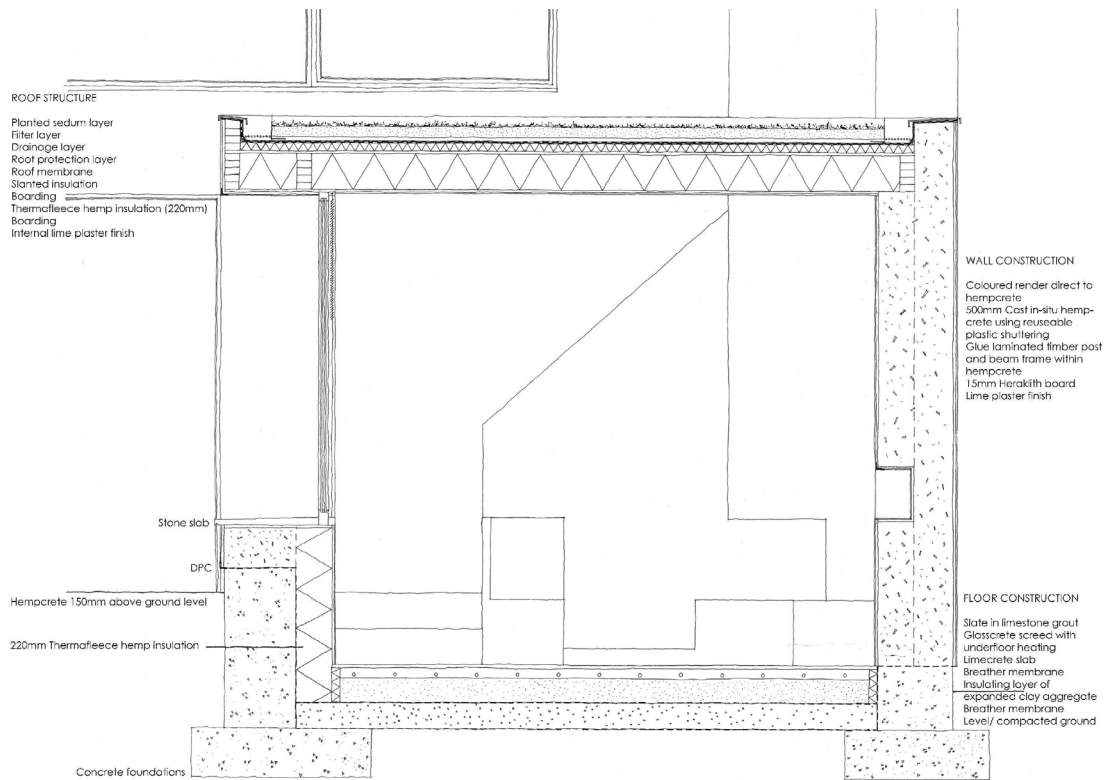


Fig. 7.128 Detail of application of hemcrete construction to design of scheme of 3 bed house type of living room off a courtyard with an external window seat

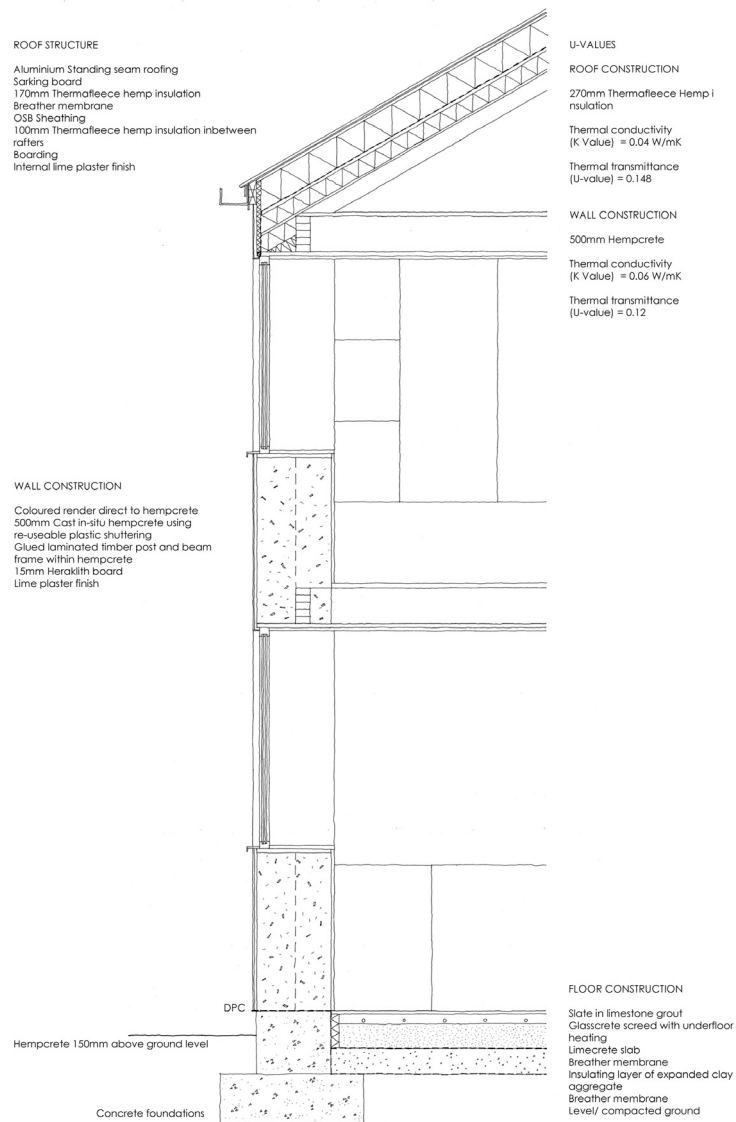


Fig. 7.129 Construction section using hempcrete through the kitchen and bedroom of 3 bed house type

The construction types are compared against each other considering a number of different factors including how locally the material can be sourced, availability, sustainability, durability, economics, buildability, material properties, and expression of construction material, textural qualities and simplicity. The chart illustrates hemcrete is the most viable construction option for the scheme, however other material finishes are considered for other elements of design.

	Locality of sourced materials	Availability	Sustainability	Durability - Lifespan	Economy	Buildability	Material Properties	Expression of construction/ material	Textural Qualities	Simplicity
CONCRETE	Sourced in the U.K. Made of a mix of aggregate, cement and water.	Widely available in the U.K. However, Misopconcrete construction is not licensed in the U.K.	The materials that make up concrete are sustainable in that they are natural. The extraction, mixing and application is less environmentally friendly and after use it is hard to dispose of.	Durable and lasting.	Competitive material cost but formwork is expensive.	Flexibility in design. Not a widely used material in house-building. Skilled workforce needed.	Load-bearing Insulating capabilities Thermal mass Protection from elements Large spans - flexibility Robust Exposed finish	Heavy mass of material expressed in construction, but structural reinforcement is concealed within the material.	Raw texture of material expressed. The construction is more complicated with the addition of insulation but the building process is not altered drastically.	
STONE	Can be sourced from local quarry.	Not always an option as many quarries have closed.	Natural material but non-renewable.	Solid - long lasting and weathers well.	Expensive - could only be used as a cladding.	Skilled labour needed. Only used as a cladding in a layered construction usually with a masonry load-bearing wall or timber frame.	Load-bearing (but not as a cladding) Thermal mass Protection from elements Robust Aesthetic natural quality	Not true expression of material used as a cladding.	Natural material used in its raw state with connection to surrounding landscape.	When used in a layered construction some of its inherent properties are not utilised and other materials are introduced to fulfil these functions making the construction more complex.
CROSS LAMINATED TIMBER PANELS	Manufactured and imported to U.K. from Austria and Germany. Panels are usually made from softwood spruce, larch or various firs. There are plans to establish a plant in the U.K. using British timber.	Currently imported. The spruce is renewable and is readily and widely available.	Renewable material. Stores carbon through its usable lifespan. Transportation impact is high.	Lifespan of over 60 years. Dependant also on the external rainscreen cladding.	Competitive cost. Relatively high cost of fabrication, but manufacture and speed of construction can reduce costs.	It is a simple and fast onsite construction process.	Load-bearing Large spans - flexibility Renewable Stores carbon Vapour permeable Airtight Light weight Robust Minimal thermal bridges	The timber can be left exposed internally but an external cladding or render is required to provide a weatherproof envelope.	Natural wood finish internally and chosen cladding externally.	The CLT forms solid load-bearing planes that are easy to install and form a homogenous surface. However insulation and an external cladding must be fixed to the structure adding to the complexity.
HEMP LIME	Hemp is grown widely in the U.K.	Widely grown and becoming an increasingly popular building material.	Low carbon building material - stores carbon. Renewable natural raw material with good insulation properties and thermal mass.	Estimated lifespan of several hundreds of years.	Currently slightly more expensive than traditional methods but this lowers if the form is repeated. Heating cost may be lower.	A timber frame must be built first and then the hemp wall is typically cast or sprayed as a non-structural infill to the timber frame.	Renewable Good insulation properties Thermal mass Stores carbon Vapour permeable Airtight Light weight Minimal thermal bridges	Material must be protected externally with a render or rainscreen cladding. It can be expressed internally but is usually lime plastered. The timber frame can be revealed.	The natural material can only be expressed internally.	The homogenous material performs a number of functions. A protective layer is only required on the exterior and a structural frame within. The construction contains few layers making it more simple.

Fig. 7.130 Chart comparing different materials properties

- **Materials chosen for practicality, availability, locality, and aesthetics**

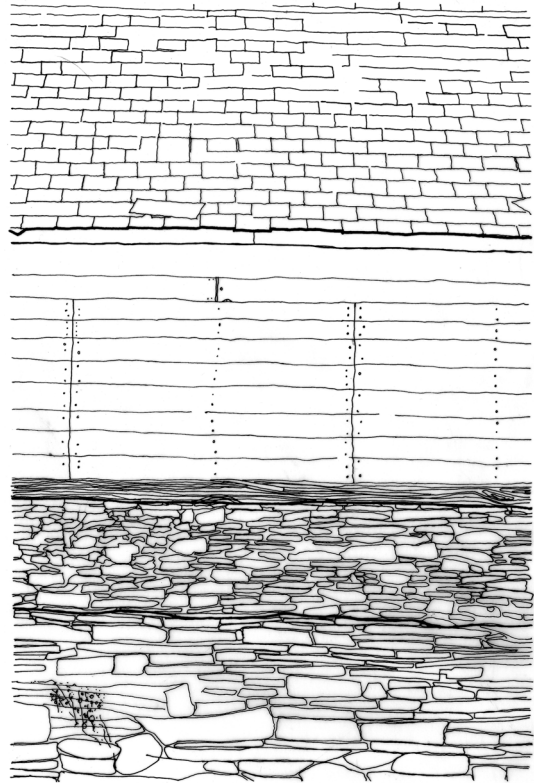


Fig. 7.131 Study of materials of a vernacular barn opposite the site and part of Pen y Dre farm. Textural qualities of stone, timber and slate forming a horizontal aesthetic quality

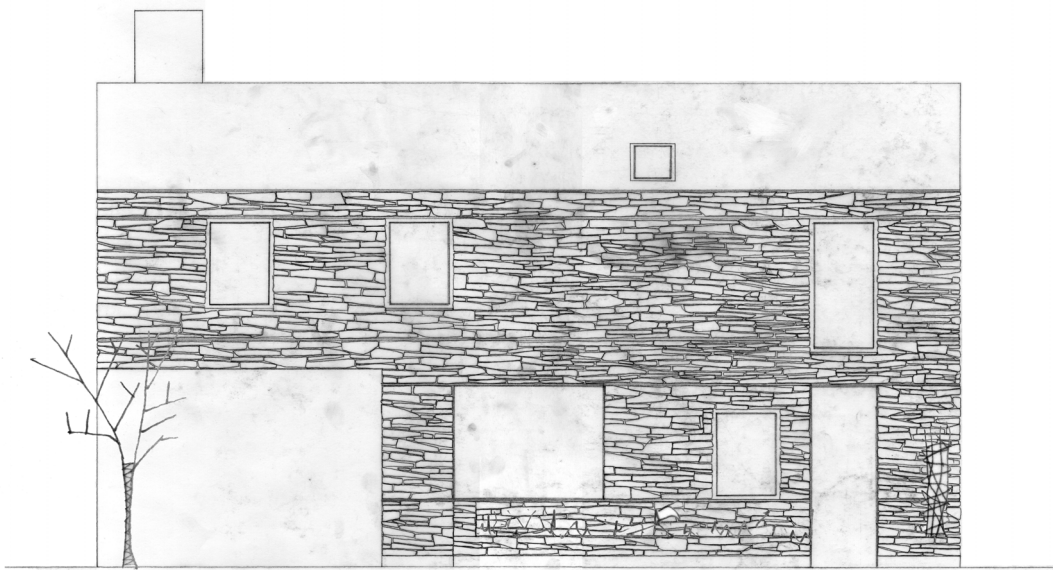


Fig. 7.132 Material study of north and south elevations with facades clad in local stone 1:100

Materials proposed for scheme

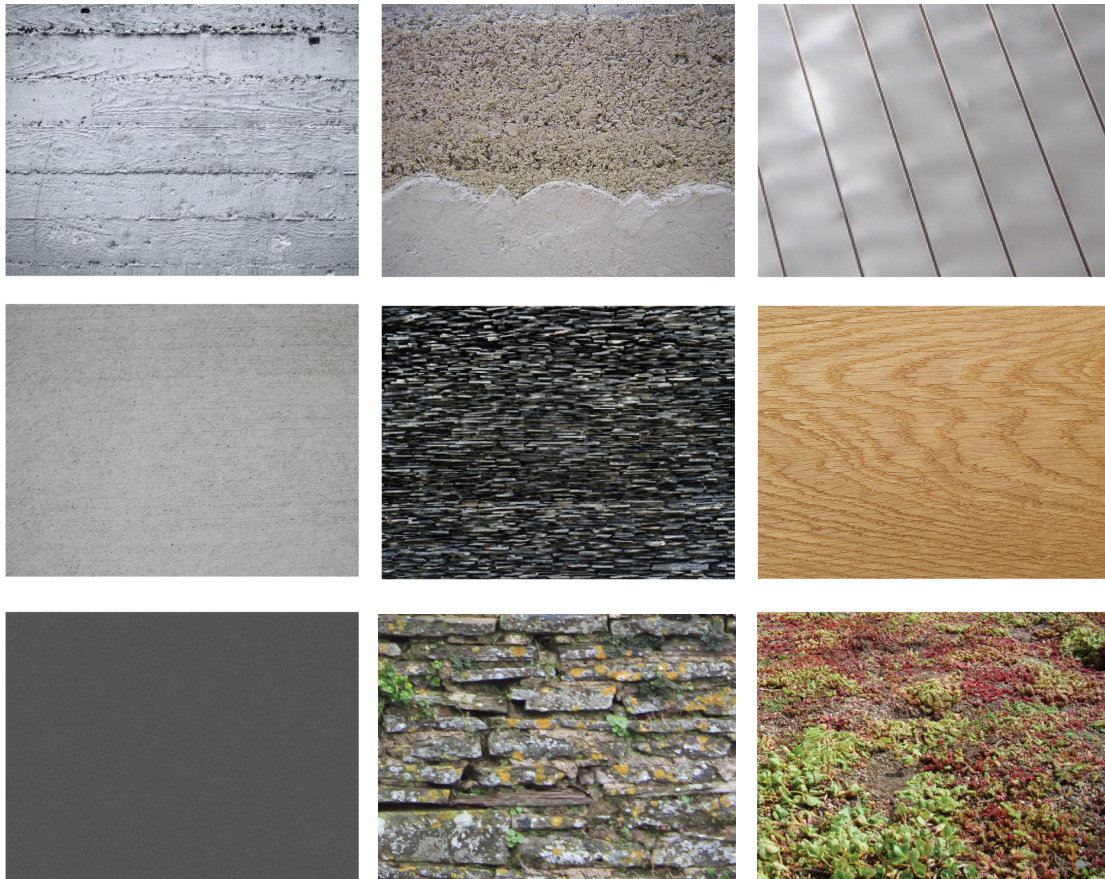


Fig. 7.133 Materials specified for the design (from left down, centre down, right down) In situ board marked concrete; Smooth finish in situ concrete; Dark grey lime render; Hemcrete; local stone; Slate; Aluminium standing seam roof; Timber; Sedum roof

- **Cultural elements of the building tradition**

Hearth

The hearth is the dominating feature of the living space. The fireplace and chimney internally and externally creates a vertical sculptural element to the space which connects with the ground. The hearth is the grounded element of the house and is constructed of concrete. The concrete is a solid and heavy material formed from elements of the earth which grounds the hearth to its place. The in situ cast concrete fireback also acts as a banister for the stair that wraps around the fireplace, typical of traditional Welsh farmhouses. The concrete fireback represents the pentanfaen, 'stone head of the fire'. To one side of the fire is the carreg aelwyd or hearthstone.

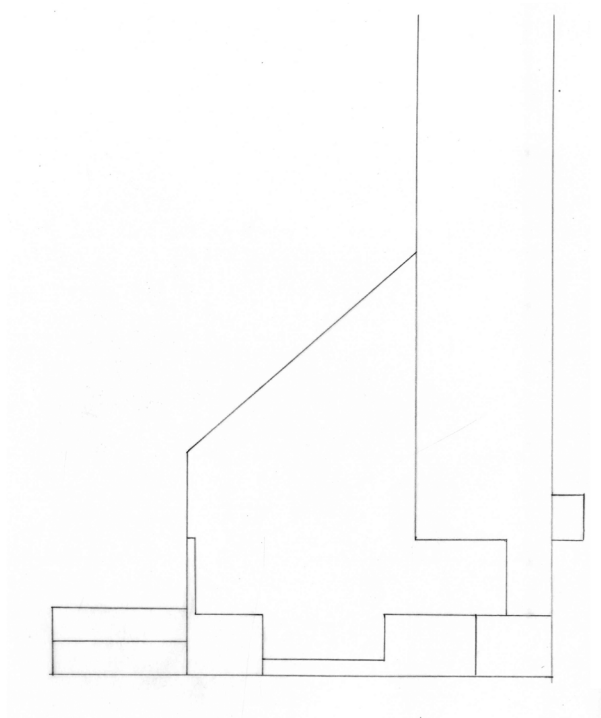


Fig. 7.134 The hearth provides a focus for the living area and is at the heart of the house.

Place by the fire

The hearth is used to divide space and create more intimate places. It is positioned against the wall, which provides a focus to the room. A contemporary reinterpretation of the inglenook is created as a more enclosed area is made around the hearth from the main space. It provides a warm and intimate place around the fire for the family to gather.

Built in furniture around the fire similar to the settle characteristic of Welsh farmhouses creates places to sit which forms a more enclosed space. The settle also provides storage within it and niches to place objects. Instead of a mantle over the fire, a niche by the hearth provides a place to house an item precious to the family.

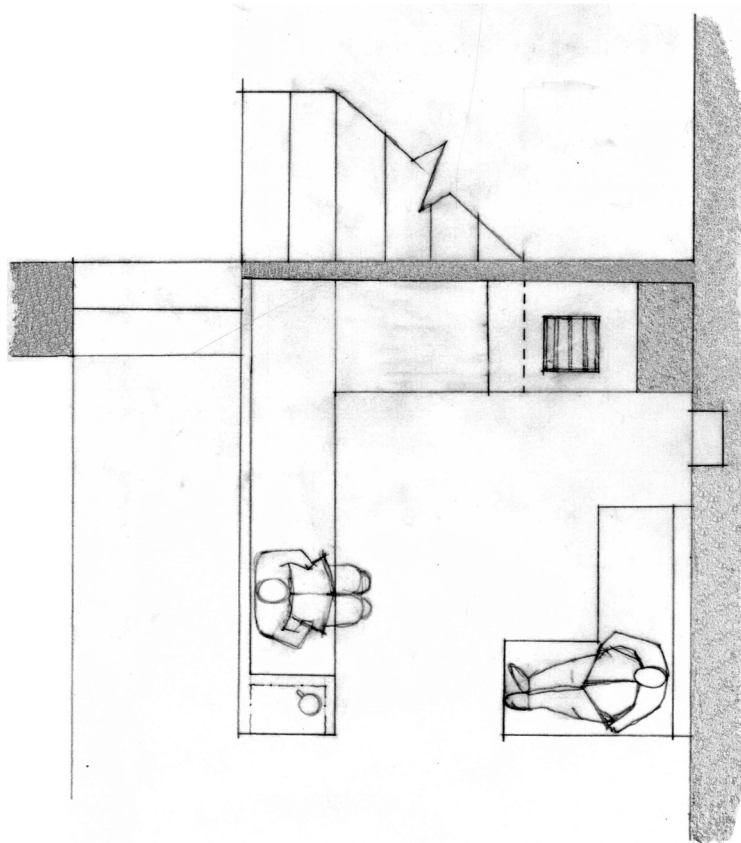


Fig. 7.135 The fire creates pleasant sensory and physical warmth in contrast to the monotonous and temperate environment central heating generates. The hearth's significance in contemporary design is also to do with notions of place making – from the ritual of making and lighting the fire to social relationships and sensory effect. Plan of place to sit by the fire 1:50

Threshold

The door symbolises 'hope, opportunity, opening and the entrance of a new life, initiation and shelter'. Functionally the door acts as a boundary, enclosing space and acting as a connection between indoor and outdoor spaces. It protects from the elements, provides security and warmth. The doorway necessitates the transition from public to private, from inside to outside, from light to dark and a porch can mediate and prolong this transition.

There are two entrances to the dwelling a main entrance to the family house and a doorway to the workplace. The main threshold to the house differs from the workplace doorway and is read as the primary door to the house. The covered porch not only practically provides shelter, but its prominent form suggests it is the main way into the house. The threshold is also wider to suggest this. The low front garden wall rises slightly to define the entrance. The porch mediates the transition into the house. A large stone slab highlights the threshold and transition into the house through the recessed doorway.

The door to the workplace is a simple and flush to the façade. The break in the low front wall is much narrower and a stone slab pathway laid in small stones leads to the entrance.

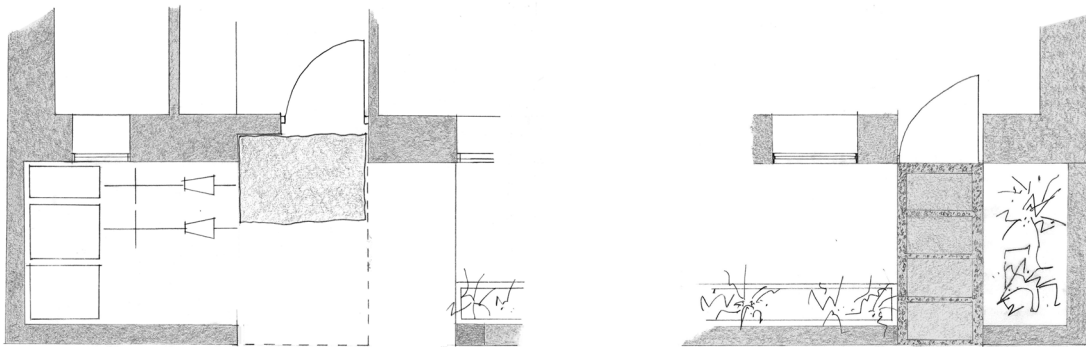


Fig. 7.136 Threshold of main entrance 1:100; Fig. 7.137 Threshold of office entrance 1:100. There is an enhanced awareness of the thresholds of the house, through material and form. The door maintains the control to communicate and enclose, to protect and hide and is instilled with symbolic and historical significance.

Niches and objects

Despite Welsh houses and cottages traditionally being simple and lacking adornment, decorative charms and objects were commonly placed in and around the home. Garments, shoes and objects have also been found hidden within the building fabric. They were often placed on plain surfaces demonstrating the power of contrast and patternmaking within a minimalist interior

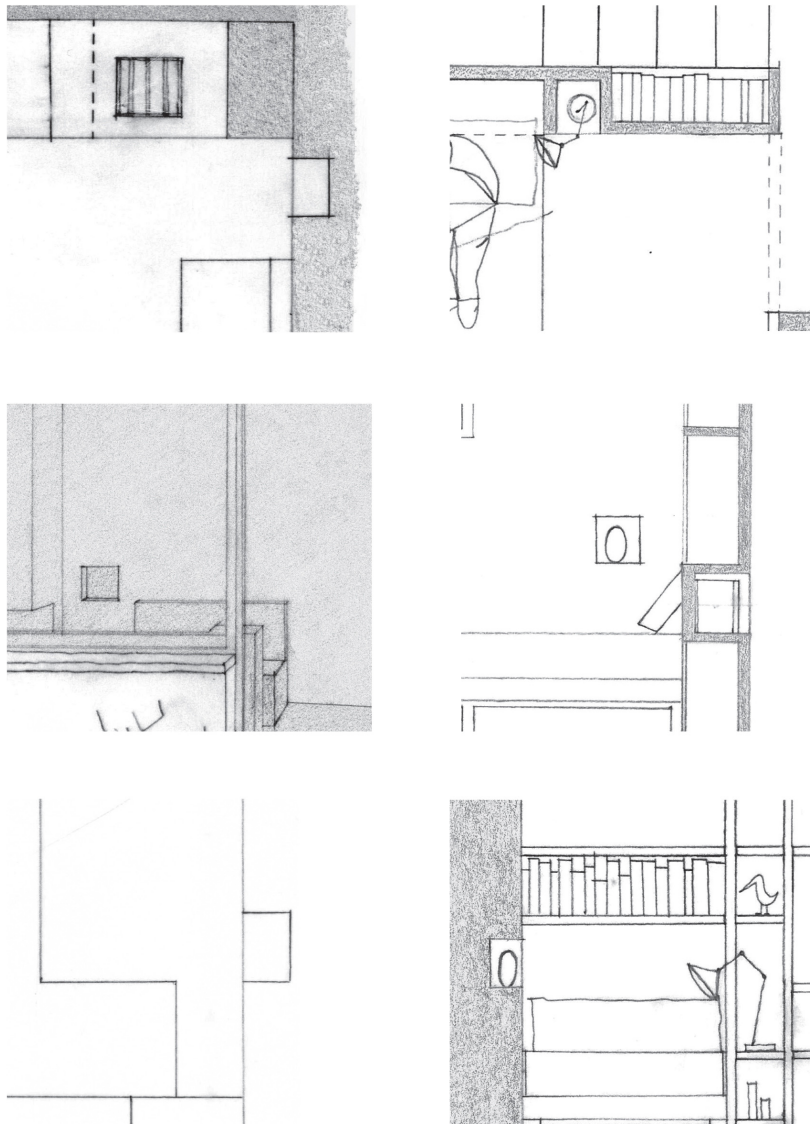


Fig. 7.138 Niches and cupboards are built into the walls for objects to be displayed in or hidden from view. The niches provide a place to keep one's possessions safe as the home itself is a place where we can hide our secrets and express our private selves. Some can be hidden from view and others displayed.

Colour

Use of colour was fundamental in households in influencing the appearance of inhabitants' surroundings and their well being. Economic, historical and social reasons shaped the traditional use of colour in and around the home. Colour selection was determined by availability, the associations linked with colours, the actual or believed usefulness of colour and the contrast between them.

Red was a significantly used colour, it often symbolises the colour of blood and is used to frighten or protect. Kennixton farmhouse at St Fagan's, originally situated in Llangennydd, in the Gower, is painted a deep red, as it was seen as a means to avert evil spirits. It would have originally been a mixture of lime and ox-blood. However it is similar to typically deep earth colours common at the time, such as madder, cinnabar, ochre, verdigris. Alongside the farmhouse is a strategically planted rowan tree (mountain ash) with red berries, which was also seen as a means of keeping evil spirits at bay and believed to safeguard cattle from sickness.

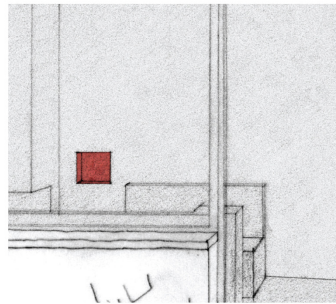
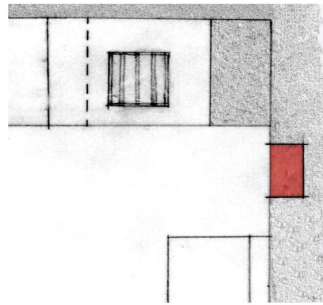


Fig. 7.139 Application of colour can seem superficial but can hold deep-rooted associations and communicate powerfully. It has been seen that contrasts of light and dark were used to distinguish places and objects within a space to highlight difference and importance. A similar approach can be applied today to give distinction between places through qualities and quantities of light and shadow, as well as use of colour.

Floor material and pattern making

Different flooring materials and textures are used throughout the house to define places or spaces within the house and to do with the functions of a space. Materials are used in different ways to create different floor textures and patterns.

Slate is used for example in a raw unpolished state, but also in the form of more regular floor tiles and is also used as small off cuts vertically arranged in a pattern set in concrete. Patternmaking on the floor is found in traditional Welsh customs. Families had their own distinct pattern which they passed down from generation to generation. The patterns were simplistic and bold in comparison to the subtle and intricate patterns of natural materials used for flooring. The patterns were used as a way of personalising and adding identity to the home.

The contrast between light and darker shades and colours of materials is used to distinguish certain surfaces, such as the doorstep and outdoor bench.

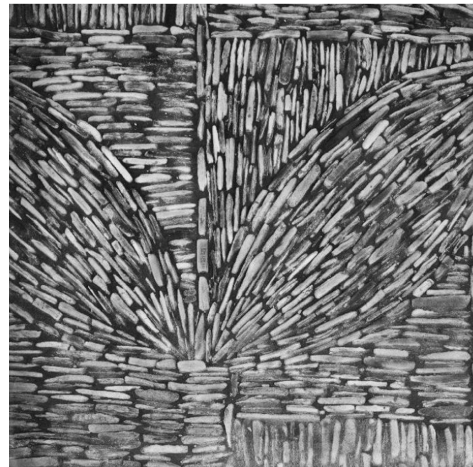
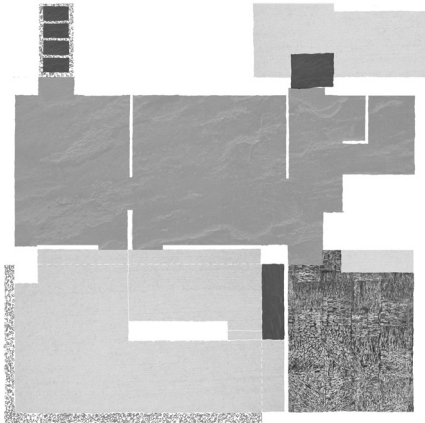


Fig. 7.140 Plan of different floor materials and textures used throughout the house to identify spaces within the house; Fig. 7.141 Pitched floor at Plasau Duon

▪ **Economy of means**

Spatial arrangement

The furniture is built in to make best use of space. The spatial arrangement draws on the idea of the box bed common in traditional Welsh cottages and farmhouses. The traditional box bed is reinterpreted as more of a room but is designed to be a place predominantly used for sleeping, with other spaces within the house designed for study and relaxing. The box bed also provides space for storage and personal items to be kept.

The single bedroom does not meet DQR and is only 3.6 sq. m with approx. 1 sq. m of storage space. DQR states that a single bedroom should have an average width of at least 2.1m.

Minimum furniture required is:

- A single bed and bedside table
- A medium chest of draws
- A desk
- A single wardrobe

Appendix C: Space standards

Note: Where a single bed is placed against a wall a space of 250mm must be provided at the foot of the bed or to a wall or robe. 200mm to all other furniture.

London Design Guide – 4.5.1 – The minimum area of a single bedroom should be 8.4 sq. m.

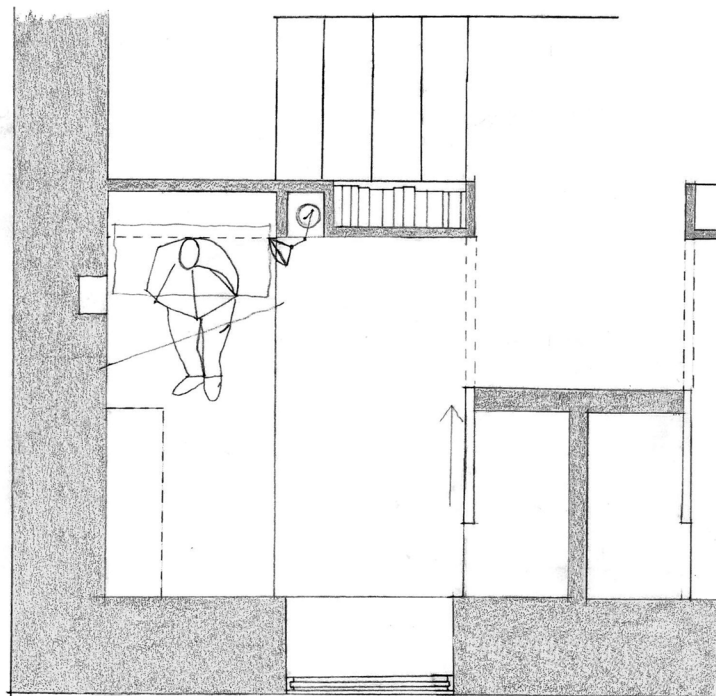


Fig. 7.142 Plan of box bed 1:50

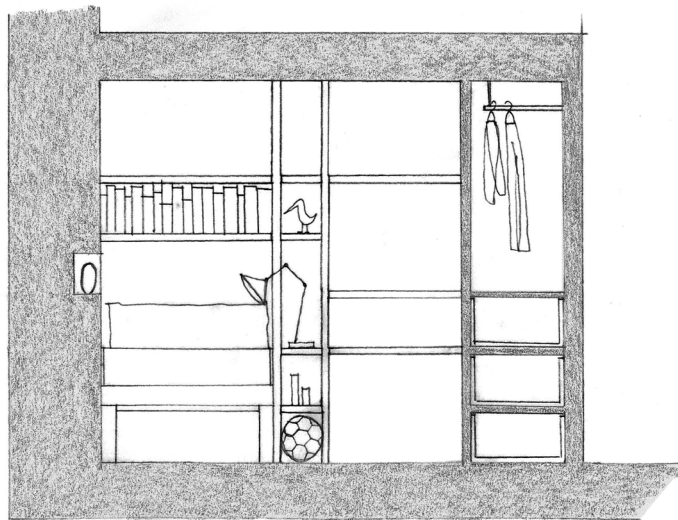
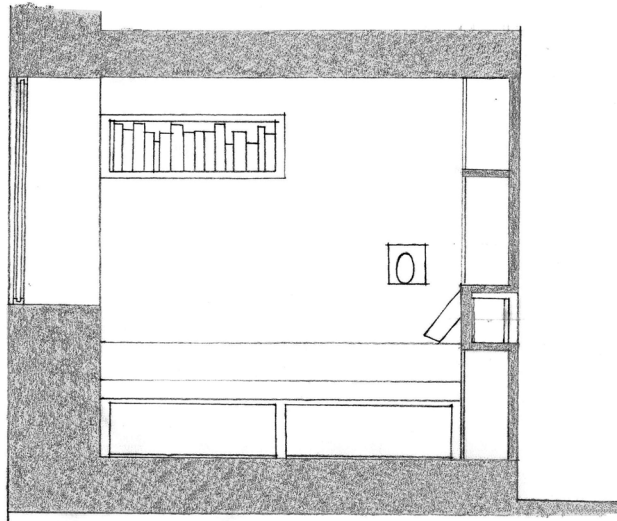


Fig. 7.143 Sectional elevations of box beds showing in built furniture and storage space 1:50

Affordability

The dwellings have been designed to meet space standards prescribed as minimum. However, whilst these are noticeably 'minimum' they are also often used as a way of controlling cost. As this is a publically funded proposal, reference has been made to cost limits for schemes of this nature. As determined in the brief the scheme aims for typical costing of social housing of between £1150 -1250 per m². This was established as an appropriate budget through discussions with Phil Roberts and with reference to the Building Cost Information Service (BCIS).¹³¹

Additional expenses in design £/m ²	Building function (Maximum age of projects)	£/m ² gross internal floor area					Sample	Unpriced excl	
		Mean	Lowest	Lower quartiles	Median	Upper quartiles			Highest
	New build								
	'One-off' housing semi-detached (3 units or less)								
	Substructure (30)	112	48	94	120	133	170	12	0
	Upper Floors (30)	44	26	-	37	-	70	3	3
10 →	Roof (30)	113	73	106	110	130	145	6	0
	Stairs (30)	21	16	-	18	-	28	3	3
10 →	External Walls (30)	146	80	98	144	197	211	6	0
	External Windows and Doors (30)	86	53	75	85	92	128	6	0
(hearth) 10 →	Internal Walls and Partitions (30)	55	43	46	50	68	68	5	0
	Internal Doors (30)	40	20	41	43	45	49	6	0
40 →	Superstructure (30)	438	306	351	405	532	654	12	0
	Wall Finishes (30)	28	14	-	32	-	37	3	0
	Floor Finishes (30)	32	22	-	34	-	39	4	0
	Ceiling Finishes (30)	16	12	-	17	-	18	3	0
20 →	Finishes (30)	91	47	73	91	109	139	12	0
	Fittings and Furnishings (30)	33	15	19	22	28	145	12	0
	Sanitary Appliances (30)	29	14	-	24	-	51	4	0
	Disposal Installations (30)	8	4	-	9	-	10	4	0
	Water Installations (30)	16	15	-	15	-	17	3	3
	Heat Source (30)	42	-	-	-	-	-	1	3
	Space Heating and Air Conditioning (30)	90	-	-	-	-	-	1	1
	Electrical Installations (30)	38	20	21	30	46	78	6	0
	Fuel Installations (30)	3	-	-	-	-	-	1	5
	Communications and Security Installations (30)	4	-	-	-	-	-	1	5
	Builder's Work in Connection (30)	8	6	-	6	-	12	3	3
	Management of the Commissioning of Services (30)	8	7	-	-	-	8	2	4
	Services (30)	159	69	129	139	177	361	12	0
	Total	1660	910	1053	1323	1557	2438		

↑
Budget set at £1150 -1250 per m²
in between the median and the lower quartiles

Fig. 7.144 Element cost per m² of gross internal floor area excluding prelims. rebased for Monmouthshire

¹³¹ Building Cost Information Service <<http://service.bcis.co.uk/BCISOnline/AveragePrices/Results>> [accessed 01 October 2013]

With reference to the table above the costs of the scheme were divided into separate building elements and it was identified where greater costs would be incurred above the target building costs of around £1200 per m².

It was ascertained that the site would incur no additional costs to the scheme, as it is typical and straightforward. The allotments would be set up by the occupants, which would keep costs down in the landscaping of the scheme.

In order to achieve Code for Sustainable Homes to a minimum of level 4, costs increased to improve the efficiency of the building envelope and U values. To achieve a U value of 0.12 W/m²K in the walls of the construction, costs would increase by approximately 10% above the target buildings costs based on satisfying building regulations. The dwellings are proposed to be built out of hemcrete as the material is a renewable resource and it also can be built simply in a monolithic construction. The objective to design simply meant that more cost effective construction techniques were disregarded for not successfully fulfilling this concept. The use of a glued laminated timber post and beam frame substantially increases costs of the superstructure over using a conventional timber frame. The reasoning behind using glued laminated timber was because of the larger spanning distances of the material, allowing for greater simplicity in construction and more freedom in composition of form. The roof is finished with standing seam aluminium primarily because of the shiny appearance of the metal and also because of its durability. This material was specified over alternative lower cost metals because of these reasons, but could increase costs by an additional £20 per m².

The hearth would also add to costs by approximately £10 per m². However the thesis argues that this element of design is critical and maintains deep rooted cultural significance.

Referring to the Building Cost Information Service as a guide, it is estimated that the design study would cost £1300 per m² to build. Therefore through employing principles from tradition in design there is an increase in building costs of nearly £100 per m². In addition to this, the expense of renewable technologies to improve sustainability credentials, such as solar hot water panels and photovoltaic panels (PV)s could raise costs by a further £200 per m². These shared renewables are designed to be installed on the outbuildings and in the landscape as opposed to integrated in the dwelling forms. The scheme would therefore cost a total of approximately £1500 per m² including these additional technologies. In order to achieve the objective to design at a cost of £1150 -1250 per m², elements of the design and the principles of the vernacular would have to be comprised in various ways.

7.4.5 Final design

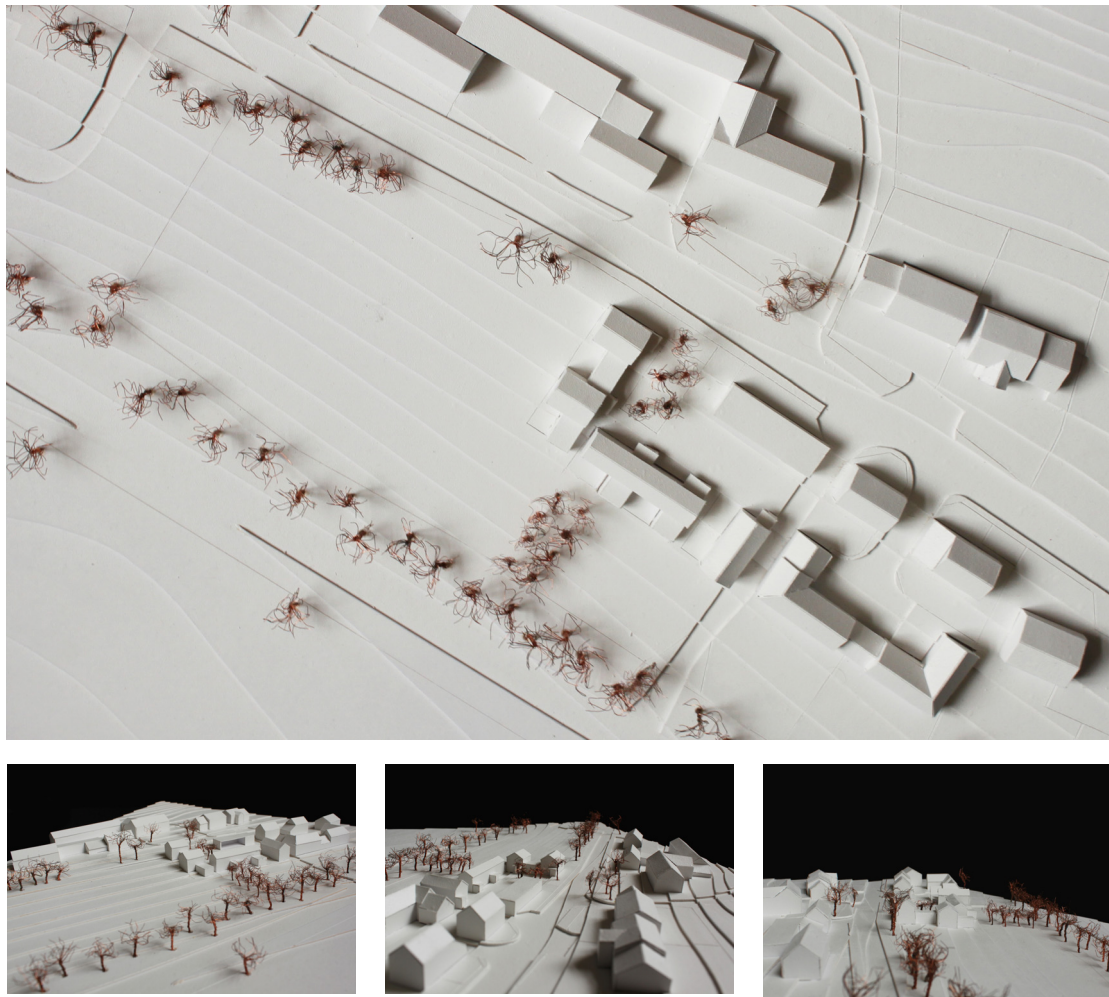


Fig. 7.145 Site model



Fig. 7.146 Site plan at 1:500

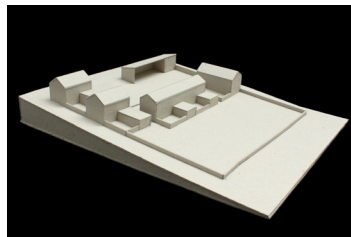
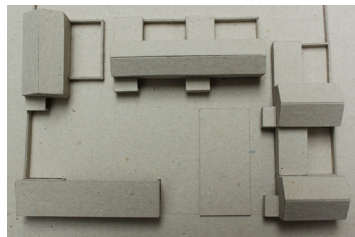
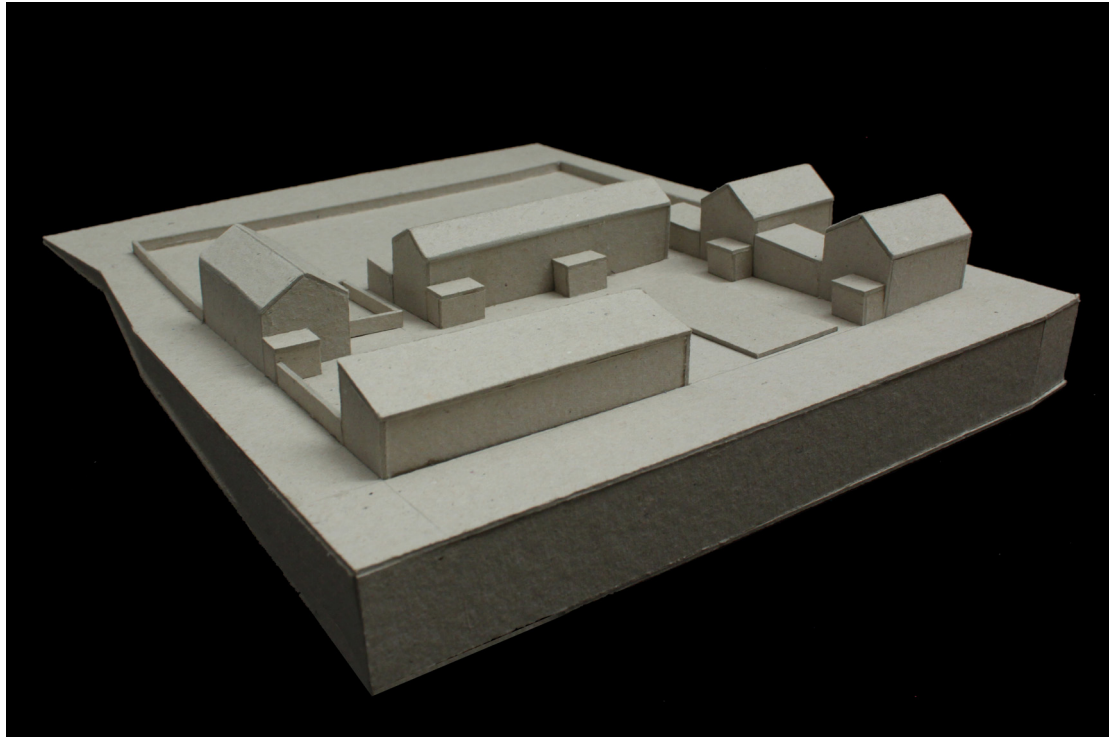


Fig. 7.147 Model of scheme to show the form of the dwellings in relation to another and to the topography of the site

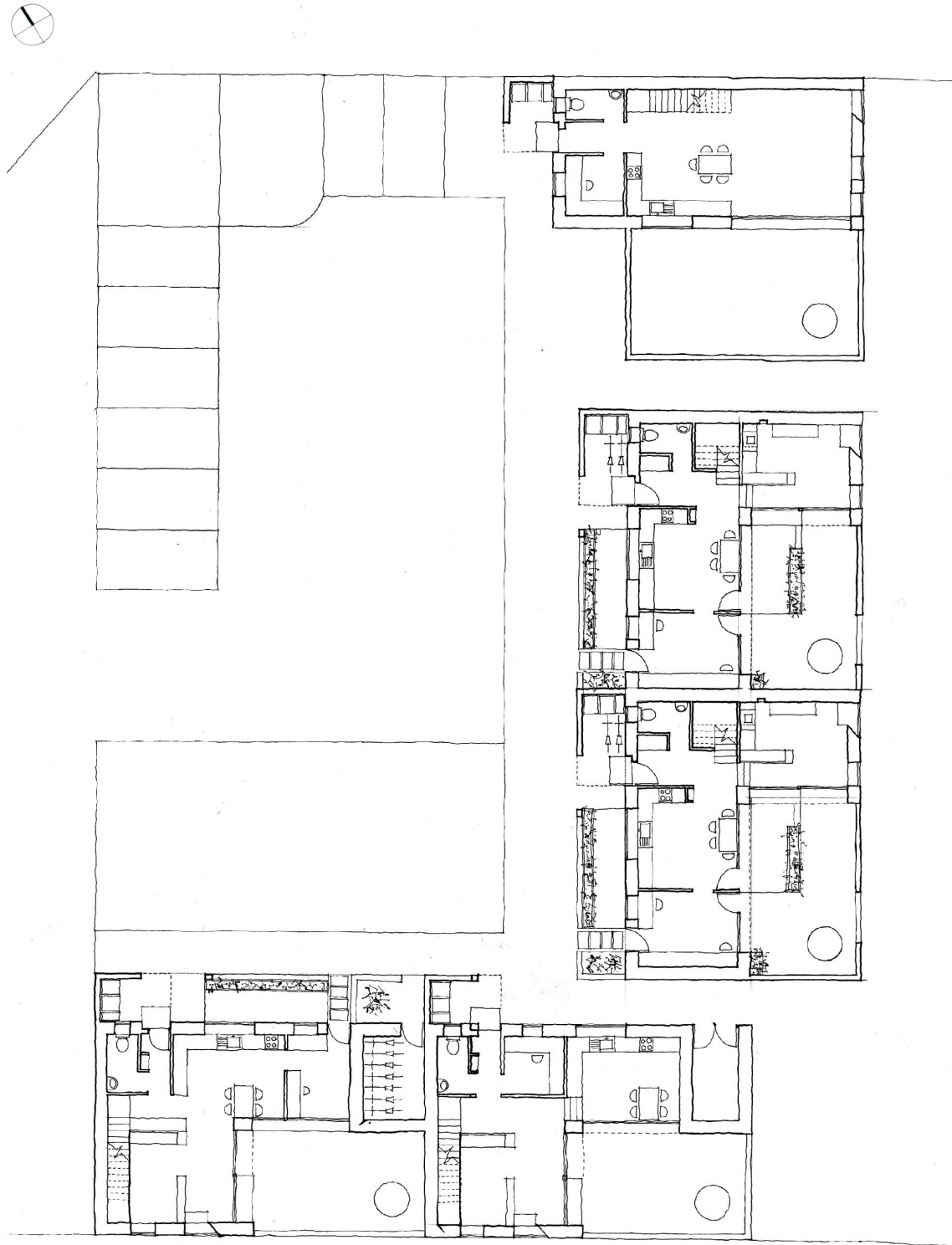


Fig. 7.148 Plan of Scheme 1:1250



Fig. 7.149 North-west elevation; Fig. 7.150 South-east elevation; Fig. 7.151 Sectional south west elevation at 1:500

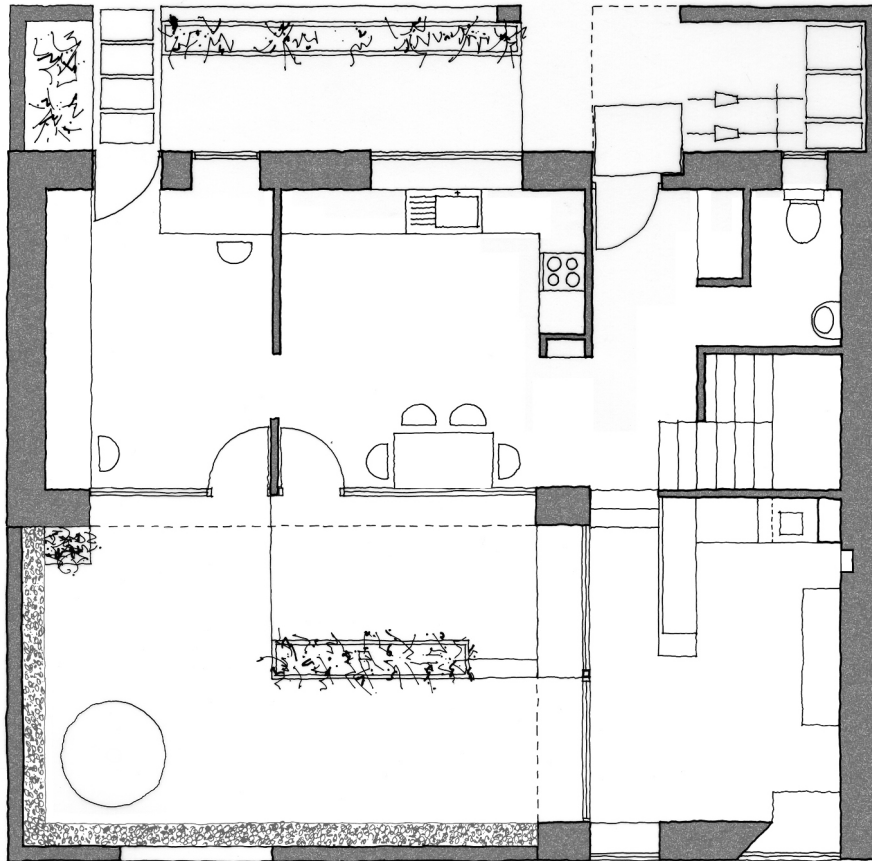


Fig. 7.152 Ground floor plan of 3 bed house type1:100

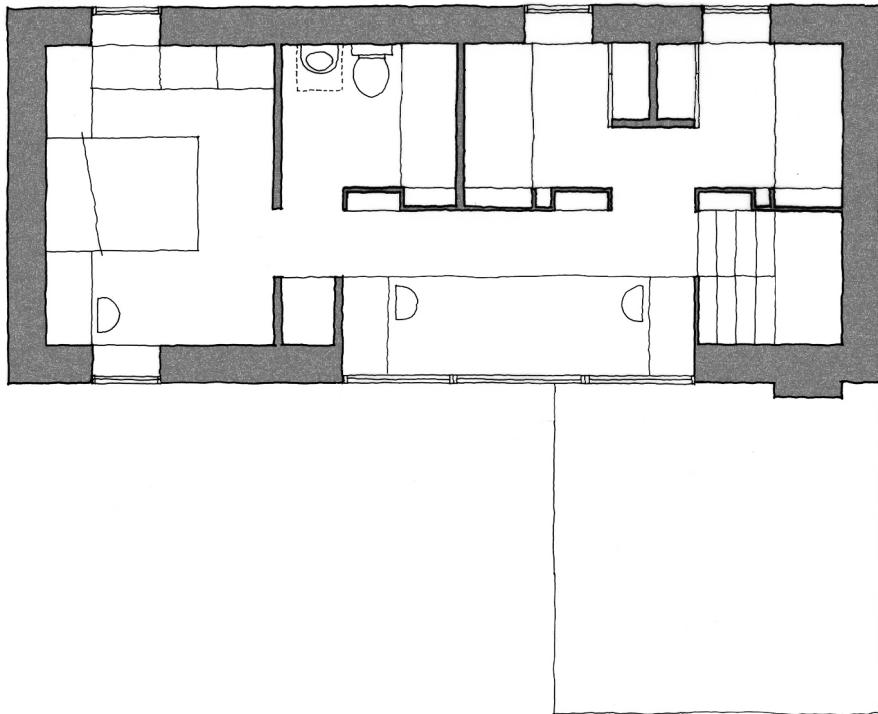


Fig. 7.153 Upper floor plan of 3 bed house type at 1:100

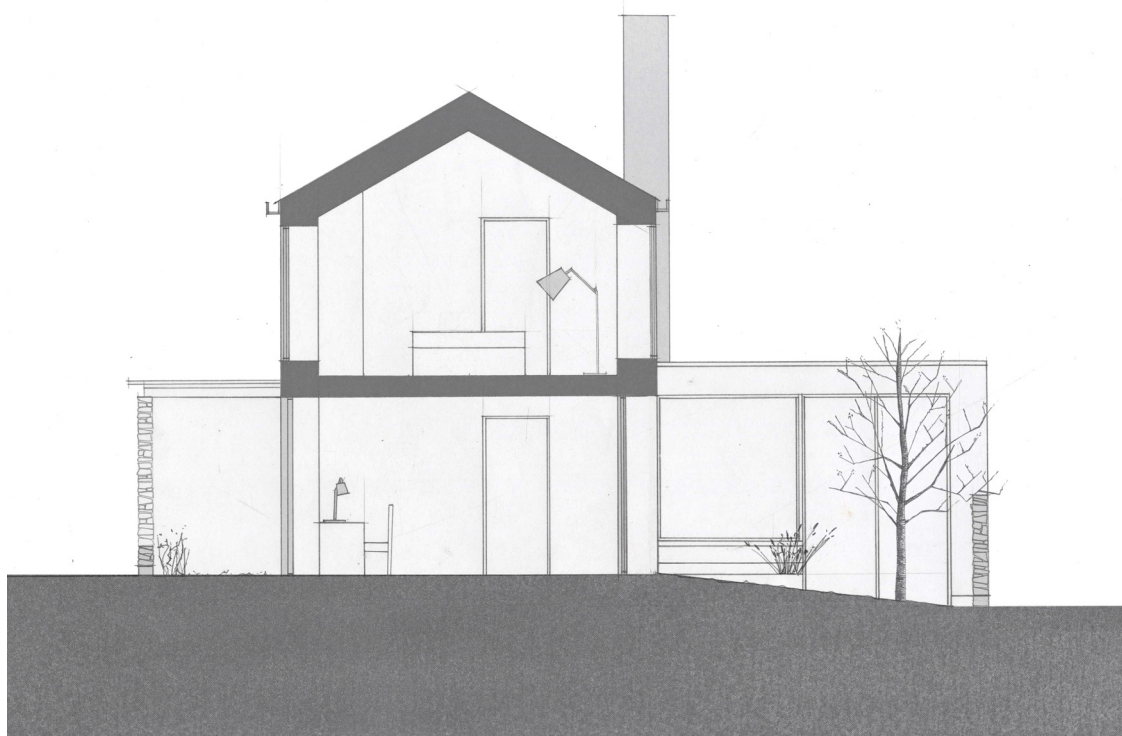


Fig. 7.154 Section through office and main bedroom of 3 bed house type with private courtyard at 1:100

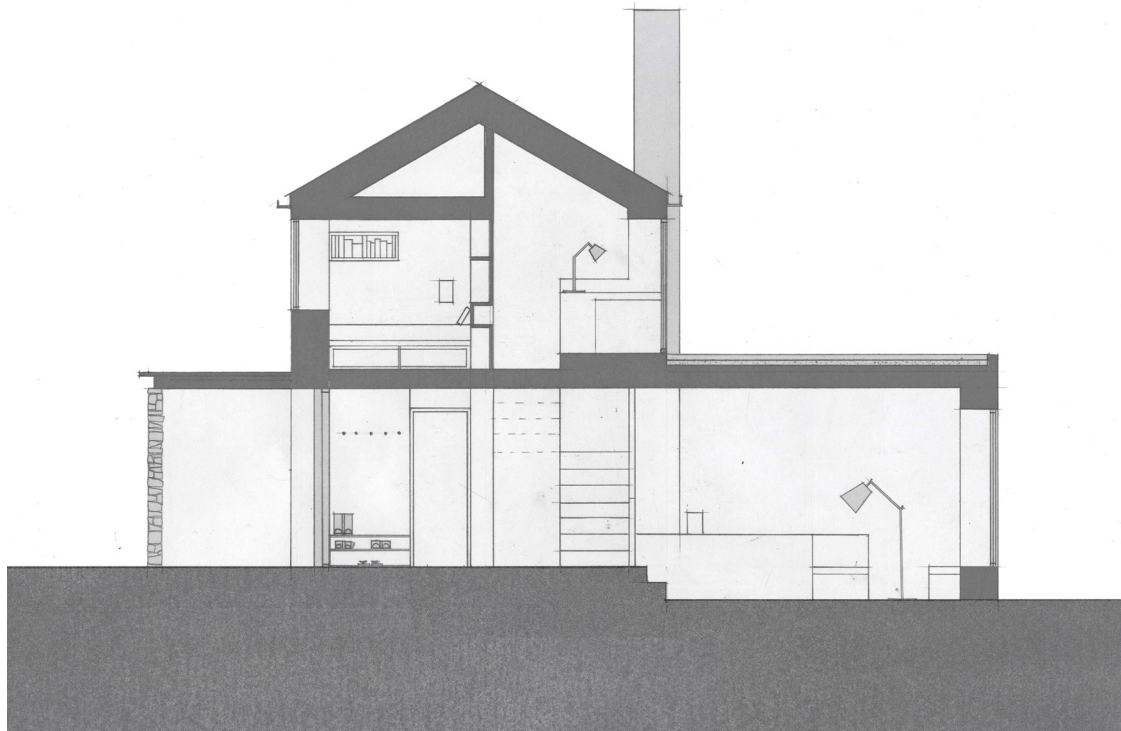


Fig. 7.155 Section through hall, living room box bed and study/play space of 3 bed house type at 1:100

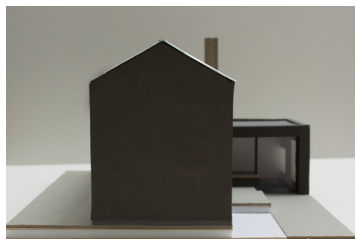
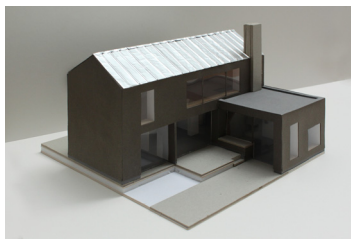


Fig. 7.156 Model showing the simplicity of form and material finish of the 3 bed dwelling type



Fig. 7.157 Model showing the construction and material finishes, in addition to the spatial layout

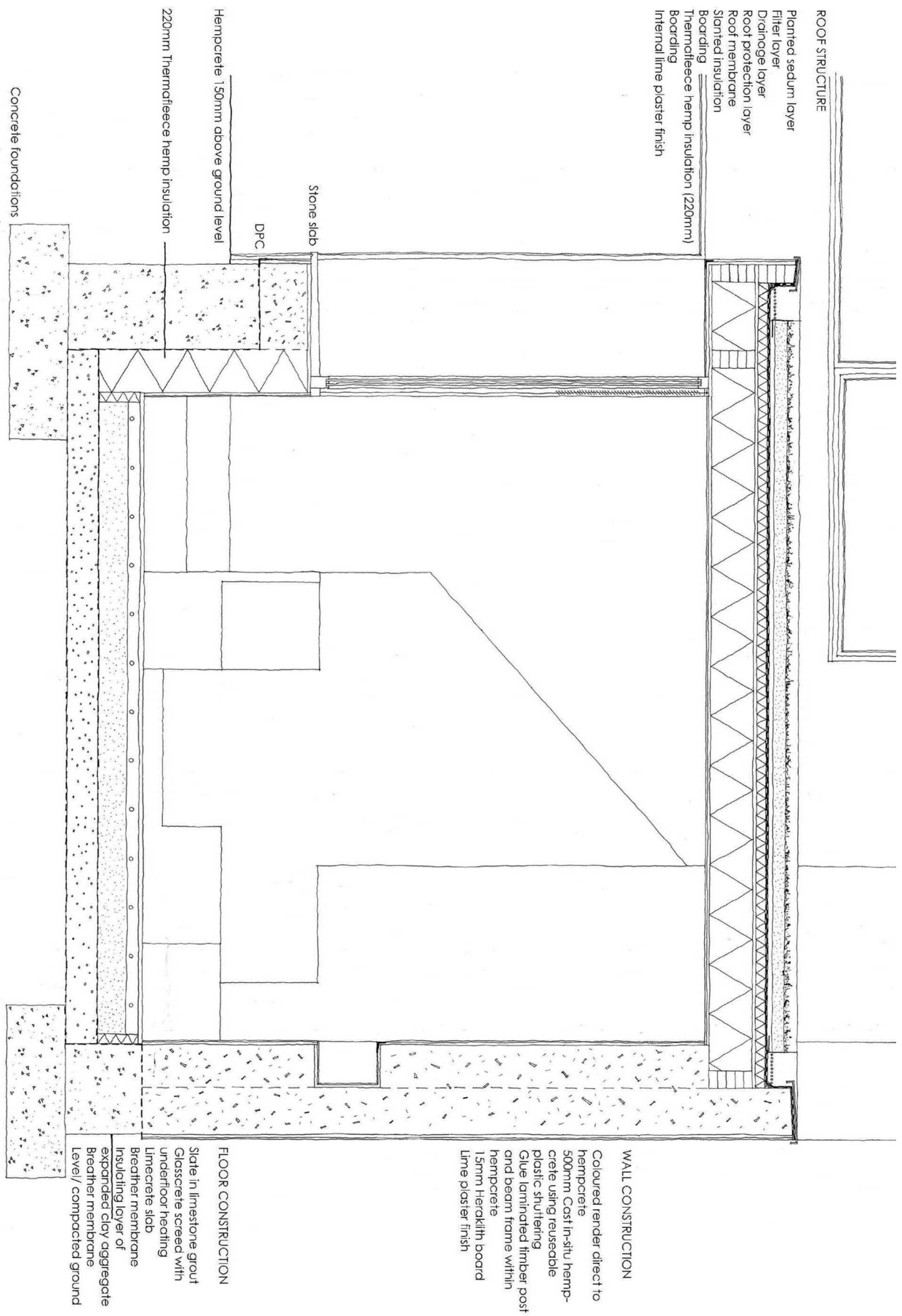


Fig. 7.158 Construction section through living room of 3 bed house type off courtyard with external window seat

ROOF STRUCTURE

Aluminium Standing seam roofing
 Sarking board
 170mm Thermafleece hemp insulation
 Breather membrane
 OSB Sheathing
 100mm Thermafleece hemp insulation inbetween
 rafters
 Boarding
 Internal lime plaster finish

U-VALUES

ROOF CONSTRUCTION

270mm Thermafleece Hemp i
 nsulation

Thermal conductivity
 (K Value) = 0.04 W/mK

Thermal transmittance
 (U-value) = 0.148

WALL CONSTRUCTION

500mm Hempcrete

Thermal conductivity
 (K Value) = 0.06 W/mK

Thermal transmittance
 (U-value) = 0.12

WALL CONSTRUCTION

Coloured render direct to hempcrete
 500mm Cast in-situ hempcrete using
 re-useable plastic shuttering
 Glued laminated timber post and beam
 frame within hempcrete
 15mm Heraklith board
 Lime plaster finish

FLOOR CONSTRUCTION

Slate in limestone grout
 Glasscrete screed with underfloor
 heating
 Limecrete slab
 Breather membrane
 Insulating layer of expanded clay
 aggregate
 Breather membrane
 Level/ compacted ground

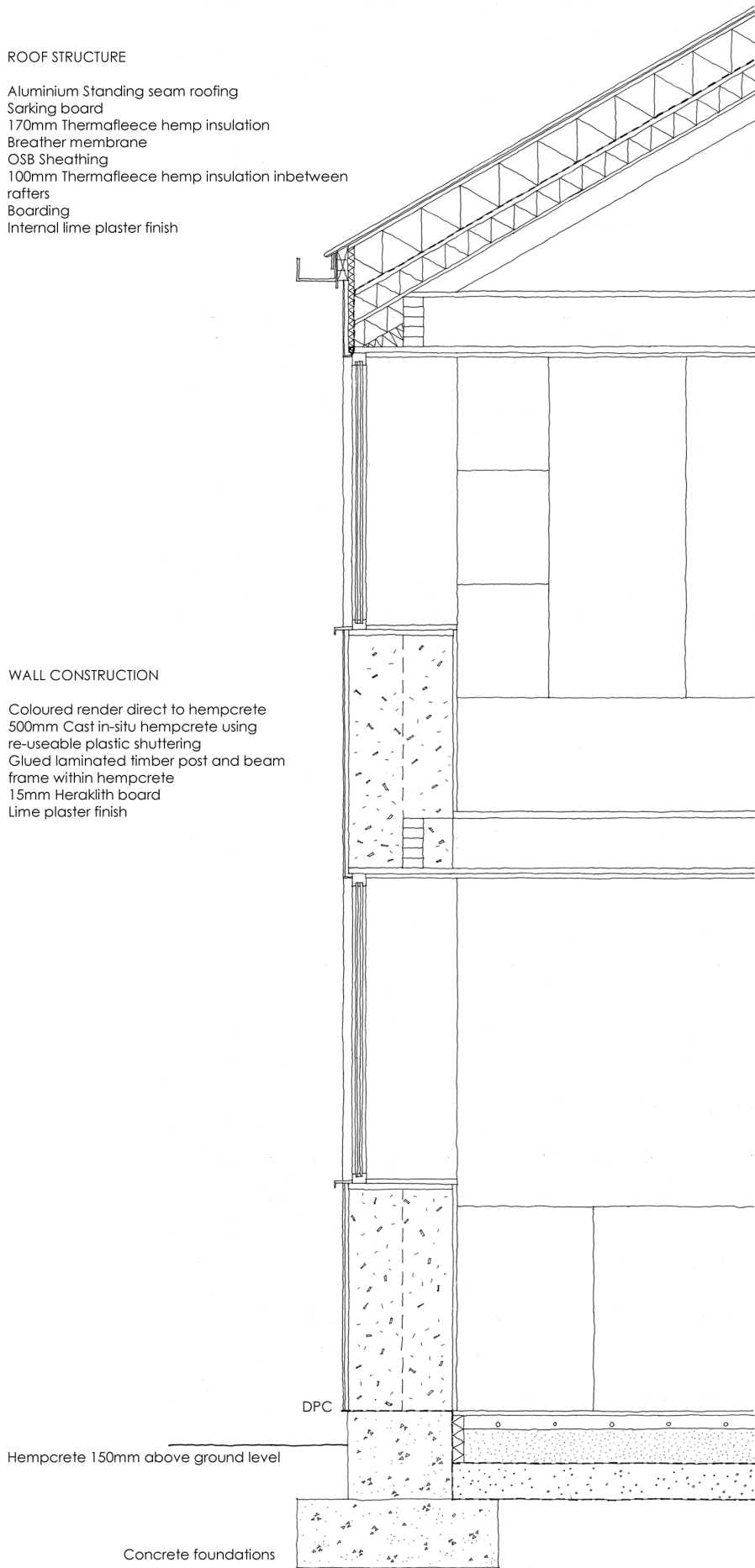


Fig. 7.159 Construction section through living room through kitchen and bedroom of 3 bed house type



Fig. 7.160 Perspective of communal courtyard facing towards the south

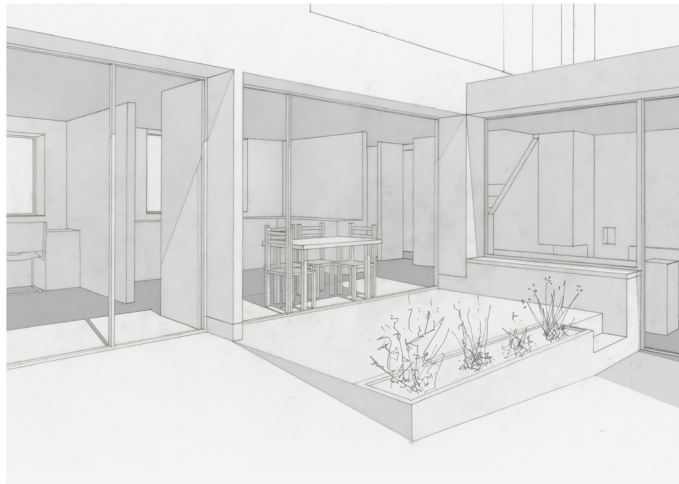


Fig. 7.161 Perspective of inner private courtyard through to the office, kitchen and living room; Fig. 7.162 Perspective of living room

7.5 Review, analysis and reflection

7.5.1 Introduction

This final design study is more focused as a clear understanding of how principles would be applied was realised from the beginning of the design process. Despite this, there were still many unknowns that were undetermined in the establishment of the principles. These were explored further through research by design and the principles were used to give the design direction and focus. The principles were interconnected and relied upon being developed together, however compromises still had to be made because of conflicting interests within the principles.

Outside influences also affected the proposed design project, which would have been even more significant if the design was carried out in reality. These were issues to do with the site, client, economics, and regulations including planning, building regulations and design quality standards. The exacting and limiting requirements in government funded affordable housing led to the design being proposed as a co-housing scheme. The concept behind the co-housing scheme was aimed at people buying into a different lifestyle than is offered in social housing schemes. This enables more freedom to explore ideas deemed important to design, without being restricted by policies governed by social housing regulations. The objective was still to develop a scheme that was affordable for people with low incomes, but who would be prepared for some involvement in the building of their homes and future maintenance, development and community involvement.

Phil Roberts acted as the client for the scheme. His guidance and advice as former Deputy Chief Executive of Ty Gwalia housing association was thoroughly considered and much of it was implemented in the design. However certain aspects were compromised where the author felt an alternative solution to the design was crucial to the focus of this thesis. These particular factors of the design are highlighted and discussed in the text below.

The model is reflected upon as an entity through the established principles.

7.5.2 Design review through principles

- **Connection with the landscape and site**

Sensitivity to and connection with the landscape and site was considered on a number of levels. This ranged from siting relating to the existing townscape in terms of positioning, scale, form, layout and context etc. to being responsive to climatic conditions of the place. The relationship of built form to the physical environment, involving natural light conditions, views out to features of the landscape and the relationship between inside and outside was also explored. In the design, a balance of experiential conditions of the environment and the

practical application of passive design strategies were adopted, as opposed to primarily being influenced by climate and orientation in the design, which from the research appears to be the most obvious and common principles drawn from tradition.

An additional important concept within this principle was for the scheme to enhance the existing community and encourage interaction of inhabitants through the arrangement of the dwellings and landscaping. One of the reasons the design was determined for co-housing was because of this. If the design was carried out for social housing, there would have been limitations on how the scheme could have been planned and landscaped. For example a communal shared space would not have been permitted. Phil Roberts argues that in reality if a housing association was running the scheme they would fight against a common space. This is because of on-going maintenance obligations of the life of the buildings. He describes how space must be under specific ownership so that land outside a defined boundary is allocated an owner responsible for maintenance.¹³² This thesis argues against the division of properties by strong boundaries, but for gradual permeability of space from public to semi public to semi private to private, without the need for high fences to demarcate ownership. A more subtle blurring of boundaries allows greater interaction with the community rather than properties segregated from the rest of the neighbourhood. It is realised that this way of planning does create tensions of ownership if it is unclear who is responsible for maintenance. Aware of these implications, a strategy for design was adopted where low maintenance plants, scrubs, trees and meadow grass are specified along with robust surfaces that require little upkeep.

In parallel, with the view to create a better environment, the design is also not driven by cars. Car parking spaces are positioned aside from dwellings, which raises issues with lifetime homes standards which states parking adjacent to entrances is the optimum arrangement.¹³³ The courtyard layout provides full surveillance of car parking and the surroundings from the kitchen windows.

▪ **Simplicity of form and construction**

In the initial design development, it was proposed that elements of the dwellings would comprise heavier more dominant forms parallel to the street, with lighter elements perpendicular to these down the slope of the site. The simple forms of the dwellings and changes in height convey this, rather than using different types of materials for construction to emphasise this. The dwellings are therefore formed of one construction type, eliminating issues of differential movement and awkward junctions. The visual expression of the single material form is simple and sculptural.

Pitched roofs proposed for the scheme are designed to accommodate storage space and provide added ceiling heights in places. Resistance to flat roofs in a rural context was also

¹³² Design review with Phil Roberts

¹³³ Lifetime Homes, Consultation on proposed revisions to the lifetime homes criteria, December 2009, p.12.

considered in terms of planning. Phil Robert suggested that a flat roofed scheme could be difficult to get through the planning process, as it would be considered too urban in its context.¹³⁴ The primary forms of the dwellings have pitched roofs, whereas one storey forms to the backs have flat roofs.

The principle construction proposed for the design is hemcrete cast in-situ, with a structural timber frame. This was considered the most feasible method to fulfil a number of aspects of building simply. The timber frame as discussed previously adds a degree of complexity to the construction approach, as it is made up of numerous elements connected together in various ways at different junctions. The timber frame in the proposed scheme is built of glue-laminated timber so fewer sections of timber are required and spans can be greater, creating a simpler construction. The hemcrete cast between shuttering is lime rendered externally and plastered internally, and avoids the need for the remaining materials normally required for the wall construction, such as breather membranes, wall ties etc. The hemcrete has good insulation properties, provides thermal mass, is vapour permeable, maximises airtightness and minimises thermal bridges. In addition to this, the material is grown widely throughout the UK, which is an important factor in 'building simply' as defined by Christian Schittich¹³⁵. The construction process is therefore not complex, but as it is not a conventional building method currently in the UK, new skills would be required. This means the technique is slightly more expensive than commonly used methods, but the construction that uses renewable natural materials has the possibility to be used more widely. In reality, it was discussed with Phil Roberts that a closed panel timber frame would be the most economical and fastest to construct.¹³⁶ There may be issues with drying times with hemcrete which may cause contractors to disregard the use of the material over much speedier construction techniques.

The use of hemcrete was also preferred because the homogenous building construction is comparable to traditional methods of stone construction in Wales, where a timber frame was often later hidden within a stone wall construction. Hemcrete maintains similar properties to stone but with the benefit of providing better insulation and being a renewable resource that is readily available today. Hemcrete proved much simpler to build with, in regard to today's building regulations, than with stone. An attempt to detail the design with a stone construction proved very complex to achieve similar levels of efficiency in the building envelope and it was impossible to achieve the same degree of simplicity.

- **Materials chosen for practicality, availability, locality, sustainability and aesthetics**

In addition to hemcrete being used as the primary building construction, a number of other materials were proposed for the design, with the objective to root the building form to its place and provide more textual finishes to the dwellings. In studying material options for the design it was acknowledged that locally sourced materials tend to be more expensive as there is less

¹³⁴ Design review with Phil Roberts

¹³⁵ Christian Schittich, *Building Simply* (Basel: Birkhauser, 2005), p.9.

¹³⁶ Design review with Phil Roberts

availability of these materials. The hemcrete however is widely available but the aesthetic result of the rendered hemcrete lacks the textural qualities of natural materials such as stone and timber. The initial principle put forward, proposed this to be critical to design. The importance of the development of a patina on the surface of materials is acknowledged because it grounds material and form to its place and time. As costs of these materials are so high, in order to specify local materials such as local stone and Welsh slate, which possess these qualities, small quantities of them are designed into significant elements of the scheme.

Porches and low boundary walls to the fronts of the properties are proposed to be built of stone, stacked in a dry stone wall construction. This skill could be learnt and employed by occupants to maintain local traditions of the place and tie new constructions in with the existing. The walls are detailed with concrete plinths to acknowledge they have been built in a new time, in a new way, where traditions have moved on. Stone is specified for the flooring in various finishes as a way to demarcate certain spaces through varied textural qualities. There are additional costs involved in not only the materials, but also the skill and time involved in retaining these traditional elements. However it is through this handmade craftsmanship that dwellings acquire a deeper meaning. Particular craft elements in the house can enhance and contrast against manufactured materials.

Hemcrete has a life expectancy of hundreds of years and the exposed concrete finish of the hearth is robust and long lasting. The stone is very durable and through time it will weather in an aesthetically pleasing way. The materials chosen for the design have been thoroughly considered for numerous factors and specified accordingly so that all the issues set out within the principle are addressed to some degree. There were no obvious most suitable materials for the project, so compromises were made to adopt a practical solution to the principle, which maintains aesthetic sensibilities.

- **Cultural elements of the building tradition**

The cultural aspects of design help create a sense of place to spaces within the dwellings, in some case through subtle detailing. These specifics of the design add to costs of construction as they are non standard and require specific skills to produce. The hearth is an expensive element of the design, however there is simplicity in the finishing and detailing. Despite the price attached to these elements the thesis argues they are critical aspects of tradition. As part of a co-housing scheme, residents could work with builders to create some of these elements of design which are particularly labour intensive to reduce costs. Residents could participate in the decoration and application of colour and floor decoration and patternmaking, in addition to skills such as dry stone walling as previously mentioned. The opportunity for residents to engage in the making of their homes gives them added meaning. Despite the added costs of some of these cultural elements, this thesis argues for the application of cultural aspects of tradition, as they help create a sense of place and retain a connection to the past. In some cases costs are not increased and only consideration of these

concepts are required in design. The cultural elements of design also add to the phenomenological and experiential aspects of architecture, in which this thesis demonstrates are critical.

- **Economy of means**

This principle includes a scope of practical and functional aspects of the design. In terms of economy of space, the study highlights how there would be difficulties in adopting some of the spatial principles from tradition in design of social housing. Space standards in Welsh Government Development Quality Standards (DQR) are set as minimum guidelines for social housing. The standards allow for little flexibility in design and will not permit alternative approaches to social and spatial needs. In the proposed scheme, box beds are designed and developed from tradition as a method of space saving. The concept is for the compact and intimate box bedrooms to be used for sleeping and storage, while the saved space can provide additional communal space where study and play space can be shared, encouraging children out of their bedrooms to interact together in a more spacious, well designed environment. If the scheme was developed for social housing, funded by the government, it would not comply with space standards. This is because despite accommodating all the space requirements in DQR, the space is divided and arranged in the house differently. An issue with the concept of the box bed is that they are too compact to accommodate a wheelchair turning circle, also a requirement of DQR. There is however the option for the home office on the ground floor to be used as a bedroom. Within the box beds there isn't much flexibility, but the space saving allows for a more flexible space to be designed elsewhere. It may be a suitable element that could be chosen as an optional extra for families as it may not suit all residents' situations. This highlights that a balance between flexibility and defined space is necessary to create a sense of place, while allowing flexibility of space that can change and adapt in the future.

The 3 bed house types are 86.5m² for a 3 bed 4 person house which is close to the standards set in the London Housing Design Guide which is 87m² for the same typology. The dwellings are compact and therefore economical, in that respect, however many elements are non standard which increases costs. A balance between unique and standard elements, experiential elements of architecture and practicality is required to produce well designed but affordable dwellings.

In terms of the affordability of the scheme, it is highlighted that through adopting some of the principles to design, costs are increased in many cases. The summaries of costs of the final design are substantially higher than the target costs proposed at the outset. It shows how it is more expensive to achieve simplicity in building in comparison to using standard construction systems commonly adopted in house building, which are often quite complex. A compromise may need to be made in the principle of building simply for the scheme to be considered affordable, in addition to other materials chosen for aesthetic reasons which may also need to

be value engineered. Some cultural elements of tradition such as the hearth add significantly to the cost of the scheme, whereas other considerations such as spatial layout, subtle modifications of form and decoration are minimal, but require consideration in the design stage. This final design requires more work on the costs of specific elements of the design to demonstrate how they could be reworked to retain their quality but at a lower cost.

The significance of design principles from the operational framework in this final design are analysed and compared against the architects investigated at the beginning of this chapter. It demonstrates which principles are fundamental to the model in this design compared to the other designers' works and which appear less critical.

	Dorian Bowen - Bynocyn	Dualchas Architects	Rural Design	David Lea	Master Class Peter Sturcbury Richard Leplastrier Juhani Pallasmaa	Final Design Study
Site	N/A	■	■	■	■	■
Landscape	N/A	■	■	■	■	■
Orientation	N/A	■	■	■	■	■
Climate	N/A	■	■	■	■	■
Ecology	N/A	■	■	■	■	■
Topography	N/A	■	■	■	■	■
Views	N/A	■	■	■	■	■
Inside/ outside	■	■	■	■	■	■
Construction	■	■	■	■	■	■
Materials	■	■	■	■	■	■
Resources	■	■	■	■	■	■
Sustainability	■	■	■	■	■	■
Technology	■	■	■	■	■	■
Locality	■	■	■	■	■	■
Craftsmanship	■	■	■	■	■	■
Form	■	■	■	■	■	■
Simplicity	■	■	■	■	■	■
Abstraction	■	■	■	■	■	■
Composition	■	■	■	■	■	■
Modest	■	■	■	■	■	■
Identity	■	■	■	■	■	■
Creativity	■	■	■	■	■	■
Culture	■	■	■	■	■	■
Human	■	■	■	■	■	■
Community	■	■	■	■	■	■
Family	■	■	■	■	■	■
Sense of place	■	■	■	■	■	■
Experiential	■	■	■	■	■	■
Texture	■	■	■	■	■	■
Light	■	■	■	■	■	■
Economy	■	■	■	■	■	■
Function	■	■	■	■	■	■
Spatial Arrangement	■	■	■	■	■	■
Flexibility	■	■	■	■	■	■
Repetition	■	■	■	■	■	■
Affordable	■	■	■	■	■	■

■ Fundamental

■ Evident but not critical

■ Not evident

Fig. 7.163 The chart compares the key principles which influenced this final design compared to those which most notably are significant to the distinguished architects studied before the design was carried out

The chart highlights how all aspects of the framework were considered to a degree in the final design. However it is evident that cultural and human elements were most fundamental to this design study. The more experiential principles relating to landscape and site also took precedence over climate and orientation. However these were still significant. Similarly materials and construction were important from a practical perspective, but also in terms of building simply and aesthetically. Simplicity and composition of form were critical to the design as they hold great importance to the author's architectural position. However composition of form took priority over building simply and spatial requirements in some instances. Economy of means was important to the design, but in order for the cultural and phenomenological principles to be applied to design, aspects of economy and affordability were forced to be less significant in the design.

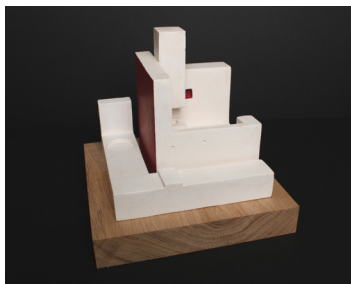
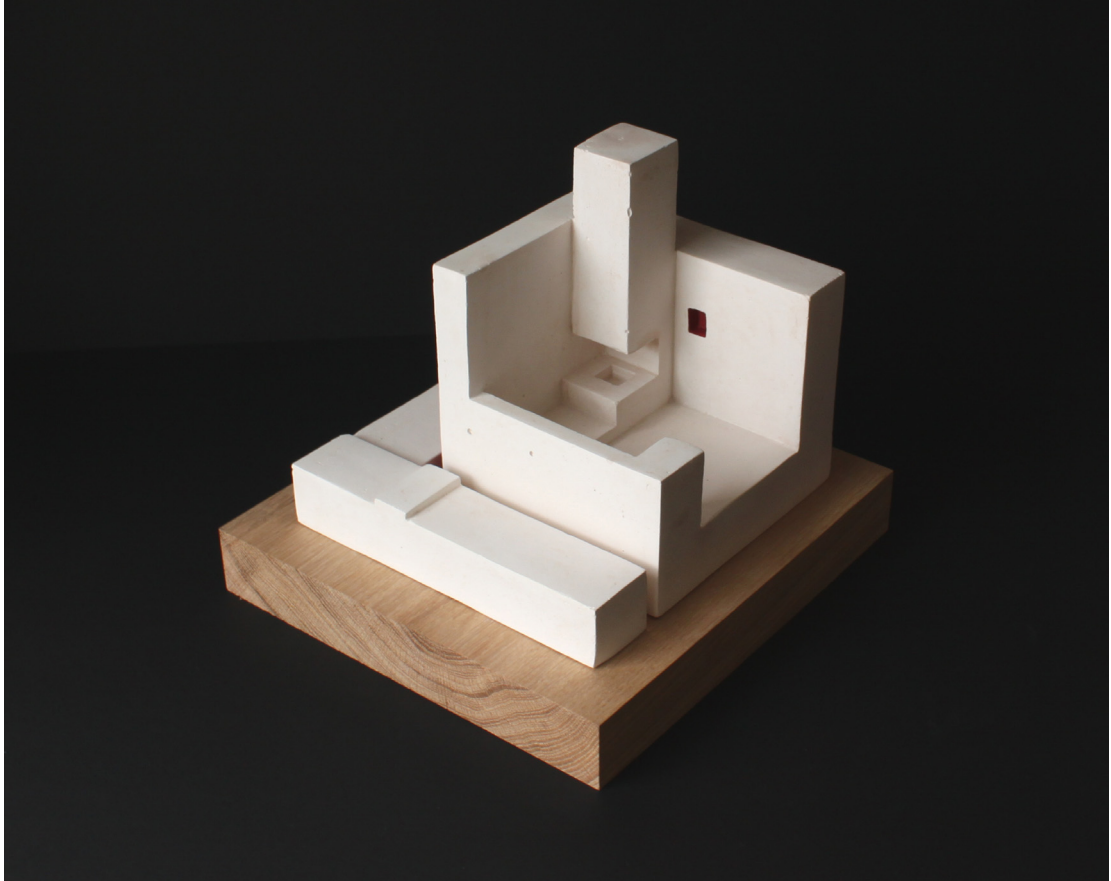


Fig. 7.164 Final piece to illustrate abstraction of cultural elements of traditions of the Welsh house in the form of a cast. The piece contains aspects of tradition that proved fundamental to the model and in forming a sense of place in the design.

7.5.3 Findings

In this final design study, a slightly different process and method was employed than in the earlier studies. Knowledge developed and refined over the previous design studies was brought together and analysed to apply to this final design. Where it was recognised that further investigation was necessary to aid the development of the model and design process, it was implemented. In this final study, the exploration involved addressing a current housing need as opposed to a typology adapted from tradition for the contemporary. The set of principles established for the design were developed from the findings of the foundation studies. However, these were much more generalised and open principles than previously defined in the other studies and could be applied to any project. However they were interrogated and defined in detail by the author to include her architectural stance on the principles. These were then utilised and tested in the final design.

Initially some additional fieldwork and research was carried out, where it was identified in the foundation studies that certain aspects of the model were weak. This involved visiting and inhabiting two traditional Welsh cottages, with the objective of experiencing and analysing the more phenomenological aspects of living in different times of the day and in different seasons. This was critical and influential to the design study as it is recognised in the research that these subjective elements of design are very important in how we live and in the making of places.

The fieldwork also involved meeting with architects and designers, who have produced works of best practice, to interrogate their approaches and philosophies towards designing in the contemporary, with reference to tradition. It also critically involved investigating the process in which the architects design. This was important to the research, as earlier contemporary building studies did not consider the process under which designers work. The results highlighted that practitioners do follow a general approach to design, but it is not methodical as numerous factors affect design in different ways, in different projects. These are influenced by the site and client/brief, amongst other factors. Significantly the interviews emphasise that the designer's architectural position is fundamental to design. Where there is determination and conviction in carrying out their principles in design, it leads to a stronger design outcome.

The study of architects and their works reveal differing objectives in design. It is demonstrated that site, materials, construction and function are most critical to their design philosophy. These objective and practical aspects of design are fundamental to the designers' works, over the subjective. However it is illustrated that David Lea and Juhani Pallasmaa are much more influenced by the phenomenological and experiential moments in the creation of architecture. The Glen Murcutt Master Class in Ireland was fundamental in addressing these issues in relation to the subtle intricacies landscape and place.

From the new model which was developed from the operational framework set up at the early stages of the research, principles were extracted. These were then defined in relation to the

author's architectural position and influence developed through the thesis. This was critical to the design, as in the previous studies, details of how the principles would be adopted was developed through the design. In this final design, the basis of the principles and how they were implemented was understood from the outset. This assisted in creating clarity and direction in the design. However some aspects of the principles were unresolved before the design study was undertaken and required exploration through the design research to establish how they can be applied to design in practice.

The formulation of the brief and the identification of the site for a group of dwellings on the edge of a rural settlement were established with guidance from Phil Roberts and using a site proposed in the Local Development Plan (LDP) in the Brecon Beacons National Park. This set out a brief for the design that is relevant and applicable to contemporary situations. The expertise of Phil Roberts and the process of carrying out design reviews were beneficial to the design as questions were raised about practicalities of the project and the reasoning behind the design was interrogated at various stages. Regulations prescribed by social housing requirements were acknowledged and analysed in relation to the aims of the thesis and the relevancy in design. It highlights how some of these regulations inhibit the opportunity to reinterpret some aspects of tradition successfully in design.

The principles established to apply to design were more successful in this design because they were quite generalised and open, encompassing multiple elements of tradition. They were understood in detail alongside one another before being employed in design. They were applied holistically and given the same value to the design. They were applied from a conceptual level to a detailed scale. This was a more successful approach to the design as it retained some of the specifics of tradition, which are often lost in contemporary design.

The design considers the subjective and the objective, the individual and the collective to the same degree. On reflection in this study more emphasis is given to cultural and experiential aspects of design than in the foundation studies, so that a balanced approach to design is met, considering pragmatic and functional requirements equally. Peter Zumthor reiterates that 'the design process is based on a constant interplay of feeling and reason,'¹³⁷ combining phenomenological insights with precision. The final design displays a greater balance of intuition and rationalisation.

¹³⁷ Peter Zumthor, *Thinking Architecture* (Basel: Birkhauser, 2006) p.21

8.0 Findings

8.1 Introduction

In testing Amos Rapoport's theory of the vernacular as a model for contemporary design through a series of design studies, the results indicate how vague the model is and how open it is to interpretation. The methodology used to test the model was adapted and developed in four separate yet sequential studies to refine and reconstruct the model in greater depth and to realise a method which could be put into practice by architects and designers. The research demonstrates that in design in practice, a method of applying a model is not usually employed, but ideas explored in the thesis are often applied unconsciously by designers who are considered to re-appropriate aspects of tradition in contemporary design. Despite Rapoport's model having been developed for architects to employ, it fails to recognise any of the issues faced by them in practice. The studies reveal the theoretical nature of his model for use by designers, as it ignores outside influences that affect design and how design as a process is carried out. The framework of Rapoport's model is indefinite and it proved to be difficult to interpret and employ. The basic model at the foundations of Rapoport's theory however remains relevant to continue to build on in the research involved in this thesis.

8.2 Findings of design studies

Testing the model in design studies, through research by design, highlighted complexities surrounding the application of a model in design, which is generally an intuitive and unmethodical process. However, despite a systematic model proving to be inappropriate for design in practice, the developed framework can still effectively be utilised and employed in contemporary design. The model system uncovers general principles and mechanisms of the vernacular, which are constant, but can be applied and expressed in various ways in design. The model developed through generalised principles and specific characteristics found in different vernacular building typologies in Wales proved critical in forming a universal mechanism that can be applied to any environment, but focuses on particular cultural expressions and specifics of place. The general framework of principles can be transferable to other cultures, environments and societies in various vernacular contexts.

In three foundation design studies the model was revised and adapted through different 'principles' drawn from the housing typologies. Significantly, the model changed with different house types and contexts, as particular aspects of dwelling took precedence over others in different situations and circumstances. The final design study utilised concepts from these studies to inform a contemporary housing typology, which was identified as in demand and requiring further study.

In the pilot design of an individual rural dwelling based on the longhouse, principles were implemented following a quite literal approach to the model, focusing on objective aspects of the vernacular. This involved utilising climate and local available resources in a self build design. Economics was the focus of the second design based on live work, with the relationship between communal and private living proving significant. Where the designs are centred on different traditions, the hierarchy of needs alters. In each successive design, principles identified as significant to dwelling types are found increasingly towards the top of Maslow's hierarchy of needs towards 'self actualisation'. In the third design of the terrace typology, community and identity were much more important factors. The basic needs established in the model of the longhouse of climate, orientation and resources were much less critical. This is even more evident today as improved technology and transportation has resulted in the basic needs, which were so critical in earlier vernacular dwellings, being much less dominant in design today.

As the design studies progress through different dwelling types, the model becomes more concerned with culture and society, and physical environmental principles appear less critical.

The findings of the three designs can be compared with one another through applying them to Peter Buchanan's integral theory in architecture.

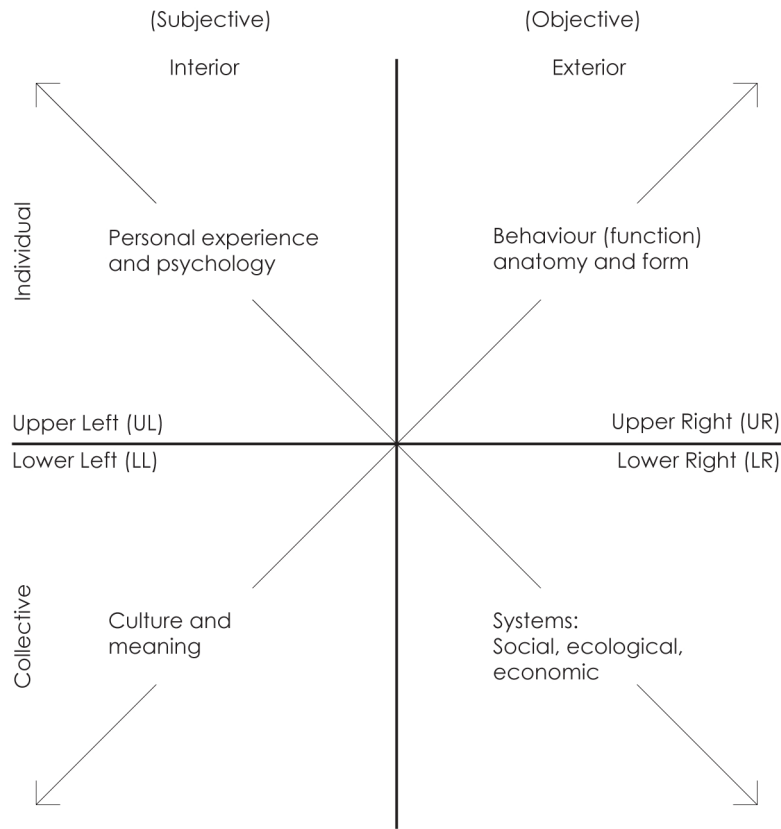


Fig. 8.1 Integral theory for architecture

The diagrams below show how the first design was mainly concerned with ideas in the right quadrants (the objective) and gradually through progression of the designs, ideas were incorporated from the left quadrants (the subjective). The third design remains bias towards the pragmatic and functional aspects of design in the right quadrants and would further benefit from greater influence from concepts of phenomenology and culture in the left quadrants.

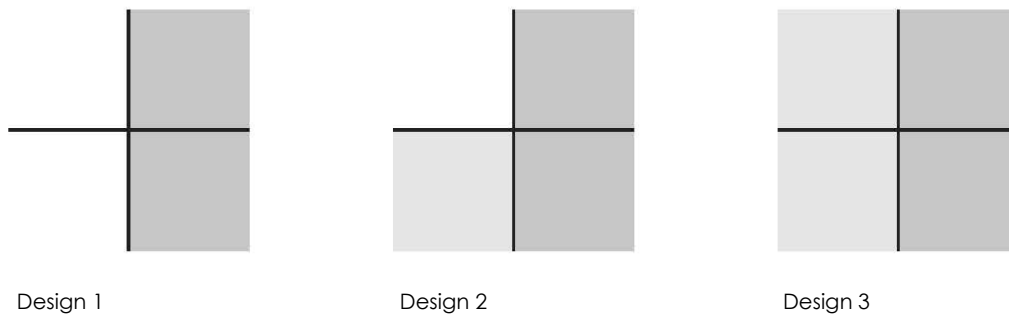


Fig. 8.2 The outcomes of the three foundation designs analysed against integral theory in architecture (no shading – not evident, light shading – evident but not critical, dark shading – fundamental)

The findings from the foundation studies emphasise that establishing a hierarchical response to significant traditions in contemporary design is not an adequate method to apply to design. Alternatively a more holistic application of principles from tradition should be adopted. In regard to integral theory in architecture, Peter Buchanan explains the importance of:

Giving equal attention to the objective, including the collective realm of systems (ecology, economics, technology and society), and the subjective, both of individual experience and collective meanings, it is particularly suited to architecture. Not least because to fulfil any promise of achieving sustainability we must draw extensively on the accumulating technical expertise of the right quadrants, while delivering the psychic satisfactions that come from attending to the left quadrants. Without the promise of such deep satisfactions as a truly meaningful life lived in accord with one's most personal values and in connection with others and nature, and of having ample opportunities to fulfil all one's potential, we will lack the will and commitment to see through the objective, and undeniably demanding, challenges ahead.¹

The research in this thesis reiterates the importance of determining a balance between the objective and the subjective, and attending to all four sections in the quadrant with equal significance.

In vernacular architectural theory, an approach of utilising lessons from the vernacular for contemporary design is widely discussed, primarily in terms of climate, materials and siting. Paul Oliver states 'if some uses of the vernacular by architects are imitative and cosmetic, several have studied climate modification by traditional techniques or made intelligent use of indigenous building methods.'² There is much less discussion about the social and experiential aspects of vernacular architecture and the opportunity of applying these lessons in the creation of place in design today.

It is also recognised that many contemporary buildings connected to tradition primarily focus on the objective in design. Similar to the designs undertaken in the foundation studies in this thesis, they show less importance to the left hand quadrants of personal experience and psychology, culture and meaning. In the pilot study - design 1, regardless of Rapoport's statement that 'purely physical forces can not determine form'³, it can be seen that other factors such as human and cultural issues are largely ignored. This is the case in both the author's own design and the contemporary precedent examples, in particular those by Feilden Fowles and Design Research Unit Wales. In these designs the physical aspects of climate, site, technology and energy use are predominant. There is therefore prevalence of the objective over the subjective and the cultural and more experiential aspects of dwelling are absent.

In terms of the use of a hierarchy of needs for design, the findings indicate that a hierarchical approach to determining principles from tradition for design is not satisfactory. This is despite

¹ Peter Buchanan, 'The Big Rethink: The Purpose of Architecture', *Architectural Review*, 231.1382 (2012), 75-83 (p.77).

² Paul Oliver, *Built to Meet Needs: Cultural Issues in Vernacular Architecture* (London: Architectural Press, 2006), p.24.

³ Amos Rapoport, *House, Form and Culture* (Englewood Cliffs NJ: Prentice Hall, 1969), p.59.

some elements of tradition appearing to be more significant than others. Meeting the needs of the user is still essential in housing delivery today. However the basic needs of dwelling are much less dominant in building today due to a greater ease at achieving them through improved technologies. The foundation studies revealed how the significance of basic needs changed in the different housing typologies, due to impact of external factors imposed by the natural and built environment and notably advances in society.

The hierarchy of needs is used very generally in the design studies however in reality the hierarchy would vary amongst people and societies over time. Lang describes how there is 'tremendous human variability in what is important and what is not... Many seemingly irrational needs are important and thinking them as unnecessary and "devoid of justification" is short sighted. For many people the fulfilment of spiritual ends, that to others are irrational, is of high importance.'⁴ In Maslow's hierarchy of needs, personal factors towards the top of the triangle, in hindsight appear to be just as important as the functional needs at the base of the triangle. The thesis emphasises that these human motivational factors should be addressed in design. 'Self-actualisation' as Maslow maintains increases satisfaction and happiness and it is this application by occupants which gives a place character and meaning.⁵ These matters form more pleasurable and experiential aspects of dwelling and are developed through creativity. They are difficult to implement in design today in comparison to the past, where occupants had much more control and input in the building of their homes. It therefore requires the designer to consider how people can creatively add identity to their homes, without losing unity and distinctiveness with the surroundings.

Therefore, on reflection and through analysis of the foundation designs, the significance of an application of cultural and individualised elements is highlighted. This is in addition to the consideration of pragmatic and functional requirements, which were initially considered the most important factors of the vernacular to be redefined in contemporary design at the outset of this study.

The development of a model through the foundation design studies also reveals how some aspects of the model, which can be conceptual or physical, general or specific, are strong and frequently translated in design, whereas others are much weaker and are rarely visible. The thesis demonstrates that some of these elements of tradition, which are harder to uncover are essential to design and should be explored further and applied to design to develop a continuation of tradition in new buildings. These elements of the model are to do with phenomenological and experiential aspects of tradition, relating to culture, as opposed to the practical considerations, which appear more straightforward to re-establish in design. It is therefore recognised that in learning from the vernacular, a constant interchange of reasoning

⁴ Jon Lang, 'The 'New' Functionalism and Architectural Theory' in *Culture, Meaning, Architecture: Critical Reflections on the Work of Amos Rapoport*, ed., by Keith Diaz Moore (Aldershot: Ashgate Publishing Ltd., 2000), pp.77-99. (p.91).

⁵ Abraham H. Maslow, *Toward a Psychology of Being* (New York: Van Nostrand Reinhold, 1968), p.31.

and feeling is required as tradition does not only teach us practical considerations, but also wider social issues and aspects of placemaking and inhabitation.

As identified, architects and theorists referred to in the literature review primarily discuss rational observations and concepts of the vernacular, which are beneficial for design today from a practical perspective. Rapoport however does recognise the importance of studying whole cultural landscapes including 'notions of environmental quality, the nature and attributes of distinctive ambience.'⁶ However he does not expand or propose how this can be implemented in design. These qualities proved more difficult to attain and employ in design than responses to site, climate, technology, resources and ways of living. They require deeper study, modification and adaptation in design than quantifiable concerns, in regard to changes in culture and society today. It is these aspects of design that are missing in the first design and gradually become more influential as the subsequent designs are carried out.

These findings from the foundation studies led to a reassessment and refinement of the model, which was then tested in a final design study. When this study is compared against previous foundation studies and applied to Peter Buchanan's integral theory in architecture, it reveals how a more equal influence of subjects found in the four quadrants are applied to design. The design considers the subjective and the objective, the individual and the collective to a similar degree.

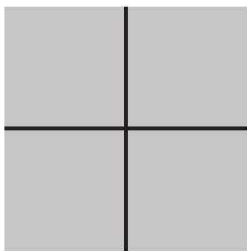


Fig. 8.3 Final design applied to Peter Buchanan's integral theory showing all quadrants are fundamental to design and have equal precedence

On reflection in this study more emphasis is given to cultural and experiential aspects of design than in the foundation studies, so that a balanced approach to design is met, considering pragmatic and functional requirements equally. The final design displays a greater balance of intuition and rationalisation. The author's architectural position developed through the thesis drove the design principles, as opposed to a more rational approach of applying principles to design. This proved important to give the principles direction and focus for design.

⁶ Amos Rapoport, 'Vernacular Design as a Model System', in *Vernacular Architecture in the Twenty First Century: Theory, Education and Practice*, ed. by Lindsay Asquith and Marcel Vellinga (Abingdon, Oxon: Taylor & Francis, 2006) p.183.

8.3 Model as an 'entity'

The model therefore sets out general principles and mechanisms that amount to a holistic consideration of the vernacular that can be defined and adopted in various vernacular environments, with influence of the designers' architectural position. The research demonstrates that principles should be considered both separately and also explored together through design.

The principles established from the developed model to provide a framework for design are:

- Sensitivity to and connection with the landscape and site
- Simplicity of form and construction
- Materials chosen for practicality, availability, locality and aesthetics
- Cultural elements of the building tradition
- Economy of means

The principles are defined further below:

The first principle considers physical conditions specific to place, with the objective to retain appropriateness and a connection to the landscape and site. It involves an innate understanding of the landscape and climate, to inform design beyond the immediate setting and what is visible. In addition to addressing practical issues of siting and social aspects of design in connection with the wider community, experiential qualities of site, built form and place should influence design. This includes consideration of how different qualities and quantities of natural light can enter a space in diverse ways, views out to markers of the landscape and of the intermediate surrounding through a connection with inside and outside. These elements enhance and intensify the relationship between built form and place, to give a closer association between building and the landscape.

Simplicity of form and construction involves simple, reduced form and minimal aesthetics, abstracted from traditional form. Construction should aim to be straightforward and continue to be made simply in the sense of traditional methods, but using modern techniques. The objective is for simple design, construction and reduced details, with focus on the building essentials. This is whilst creating an overall restrained and modest composition, which contains the ability to be individualised by the occupier to develop meaning and create identity to place. Today it is difficult to achieve simplicity as recognised in the design studies in the thesis. This is in comparison to the vernacular, where it was a necessity to build simply because of the limited availability and advancement of resources and building techniques. Today there is a requirement to achieve high standards of efficiency in the building envelope, which makes it much less straightforward to build simply and it is now an aspiration and an art, rather than a necessity.

Materials should be selected for their suitability to address numerous issues. These include that they should be chosen to fulfil their function and be durable to withstand site conditions and building usages. Materials should be easily obtainable and be able to be purchased as locally as possible and also originally sourced and processed within close proximity to the site as applicable. They should be able to be handled by local builders, without the need to bring in specialists from afar. For reasons of sustainability, natural materials should be used where possible, but principally because natural resources maintain a direct connection with the landscape through their textural qualities. An awareness of the weathering and wearing of materials over time is an important consideration in choice of materials. Materials should also be chosen for their expression and exterior quality, in relation to the context in which they are used. This range of issues should be addressed. However there will be greater focus on some matters over others, depending on their application and usage in the building and the specifics of the project brief. Materials specified also require consideration with the previous principle of building simply.

In order for design to retain meaning through continuity and abstraction of cultural aspects of tradition in contemporary design, the thesis argues that cultural traditions that have shaped the vernacular Welsh house and its connection with the surrounding landscape in a range of forms should be adopted. These traditions and myths have revolved around and emphasised elements of the house that were so essential to everyday lives of the people. These include the hearth and thresholds, which were key foci of the home traditions revolved around. Cultural traditions have influenced the making of places and informed the way in which spaces were created and inhabited, including mark making and decoration on the building fabric. Cultural meaning behind traditions and rituals has adapted or been lost with changes of use, material and form, as their relevance to society changes with time. The thesis argues that these deep rooted customs may be revisited and evaluated in terms of the design of the contemporary home to retain continuity with the past and re-establish some of the more experiential and human factors of the vernacular.

Economy of means relates and impacts on many aspects of design with the ultimate aim to produce affordable design. This principle involves economy through efficient use of space within buildings, designing form effectively but to a minimum. Prescribed space standards in design however means there are limitations on how space can be designed as regulations are focused on quantity as opposed to quality of space. The standardisation and repetition of elements can also result in less wastage of resources and reduced costs. Expense of materials should be considered and building should be affordable to construct.

The research therefore establishes that these principles are instrumental to the model. They can be applied specifically to design projects based on the vernacular in different contexts. It should be recognised that some aspects of the principles are more fundamental than others and that there is opportunity for designers to consider the principles in relation to their architectural viewpoints.

8.4 Model as a 'process'

Through the design studies, a method of how to employ the vernacular as a model for design is reassessed. This includes addressing how the literature and contextual study is conducted to involve a more in depth, holistic survey of the vernacular. It then re-evaluates how principles can be extracted from tradition to be reinterpreted and appropriated for contemporary design. The design process and review, analysis and reflection are readdressed in light of the design studies undertaken in the research in order to revise the model.

8.4.1 Literature and contextual study

The necessity emphasised by Rapoport to study all aspects of cultural environments has emerged to be critical to this study. Through the development of the model, the thesis argues for a holistic approach to design, which considers all aspects of the vernacular. The research explores ways in which to analyse tradition to inform design and provides a framework for surveying place and tradition holistically and in greater detail. This considers generalised concepts and also the specifics of place which give it meaning. It explores how practical issues typically influence the form of dwellings in their surroundings, in addition to subjective and unique cultural elements of tradition. Recognition of distinctive aspects of tradition enables narratives to be constructed that connect past and present.

Therefore a holistic approach to mapping must be undertaken to begin to understand built form within its social and cultural landscape. This involves a wide range of surveying techniques from sources involving contextual studies, measured drawings and photographs, together with cultural evidence and contemporary reinterpretation. Personal observation is essential to the research and involves studies ranging in scales from specific details to small rooms or spaces, to buildings, neighbourhoods and cultural landscapes. This is in order to observe and analyse the connection with the landscape and climate, material and making, form, cultural aspects of building tradition, and inhabitation.

This method of surveying the vernacular looks closer to sociogeography than accepted methods of historical analysis of traditional buildings. It is not intended to inform how research into vernacular environments should be carried out for historic purposes, but rather to explore how an overall understanding of tradition can be attained, that could then be used to inform the design of contemporary architecture.

Contextual studies

In historical documentation of vernacular dwellings there appears to be a focus on recording buildings that are typical of a certain typology and on whether they consist of key architectural features. Records are generally straightforward addressing important characteristics, but they seemingly disregard built form in its entirety and setting. There tends to

be a greater emphasis on structural and architectural documentation rather than material culture of domestic interiors. Despite people being central to the idea of the home, occupants very rarely appear in records. These studies therefore require further research to place them within a wider context.

It should be recognised that despite the registers and records of catalogued buildings being considered factual documents, certain information is chosen to be shown and the way it is displayed is far from neutral, 'the record is a political object, complex and multilayered'⁷. The commission investigators have a notable impact on the records and they reflect individual interests and aims, and visually each investigator has their own written and drawing styles. It highlights how drawings can critically illustrate specific ideas in the way in which they are depicted.

Comparison of historic documentation from various sources can be drawn on to determine the reasoning behind a building coming into existence and bring to light the purposes for which a building has been used. It can be beneficial to look at a much wider historic background of particular periods of history, to give an insight into the economic and the social climate of the times. This aids in understanding the rationale behind a build and adaptations that occurred along the way. Tithe maps are particularly useful in comprehending how a building has been modified and has expanded over the years. Dendrochronology has allowed for more accurate dating of buildings and documentation regarding information about past owners and tenants can aid understanding of the circumstances of occupants, which ultimately lead to building alterations. These types of historic documentation merely provide a background to the context of study.



Fig. 8.4 Use of tithe maps at Parc Lodge Farm to show evolution of farm buildings

Measured drawings and physical modelling

In the '*Illustrated Handbook of Vernacular Architecture*' by R. W. Brunskill there is an extensive procedure of how to go about recording, surveying and drawing up vernacular buildings. The method is systematic and critical for historical documentation. Measured drawings are intended to communicate information and be transferable so buildings can be compared

⁷ Rachael Barnwell, 'Welsh Domestic Interiors: Interpreting the Record Interpretation, Representation and Heritage' (unpublished master's thesis, University of Leicester, 2011), p.17.

alongside one another at corresponding scales to reveal structural and social patterns of space making. Drawings and sketches can tell us a great deal, as Peter Smith maintained 'one drawing is worth a thousand words'⁸, which was his own interpretation of a renowned Chinese proverb.

Measured drawings can be useful to identify the essential features of a building. They illustrate information about construction, form, material, layout and plain space. Measured drawings depict built form and layout pragmatically and they are most commonly drawn stripped back to their essential elements devoid of furniture. They tend to pay more attention to permanent architectural characteristics of a building, and often ignore the inhabitation of spaces through the furniture and objects within a room, decoration, surface texture and the indications of use and wear. Floor plans usually display the sequence of spaces and their alterations and additions to the building fabric at various times. The fleeting state of these buildings in a moment in time should still be recorded as this demonstrates inhabitation. It shows how people dwell within their built environment and how they bring a sense of identity to their home. It can be just as significant as the form itself as it shows how people shape the space in which they live. Drawings representing inhabitation signify lived in buildings, rather than objects connected to the past. The thesis argues that these drawings are crucial and should be made and analysed to understand space and details of living.



Fig. 8.5 Measured drawing of Llannerch y cawr showing form and construction, devoid of signs of inhabitation

In addition to surveying buildings and place, it is crucial to map the wider landscape and context. Physical modelling can aid in developing a deeper understanding of landscape and the characteristics of place, through the collection of information found in maps and through personal observation and mapping. In order to reinterpret information in the form of models to include the wider environment and specifics of place, mapping and modelling at various scales is required.

⁸ Richard Suggett and Greg Stevenson, *Introducing Houses of the Welsh Countryside* (Talybont: Y Lolfa, 2010), p.18.

Photography

Observation of photographic evidence from the past provides interpretations of life and a tracing of the physical⁹ at various points in time and in differing conditions. However photographs can often greatly exaggerate the scale of space, particularly through the use of a wide-angled lens and the quality of space is flattened into one plane. Settings are often staged and the camera is specifically directed to capture a certain image depending on how the subject is chosen to be portrayed.

Interior photographs tend to focus on only part of a room or on something particular such as fireplaces, doorways, window frames and ceiling beams. Few of the records of photographs show the home in use by its occupants and they are cleared of clutter and furniture adorning architectural features. People appear to be purposely omitted from this kind of image. The snap shot of life old photographs present, however, provides an important glimpse into how people lived in their dwellings and what they were like some time ago.

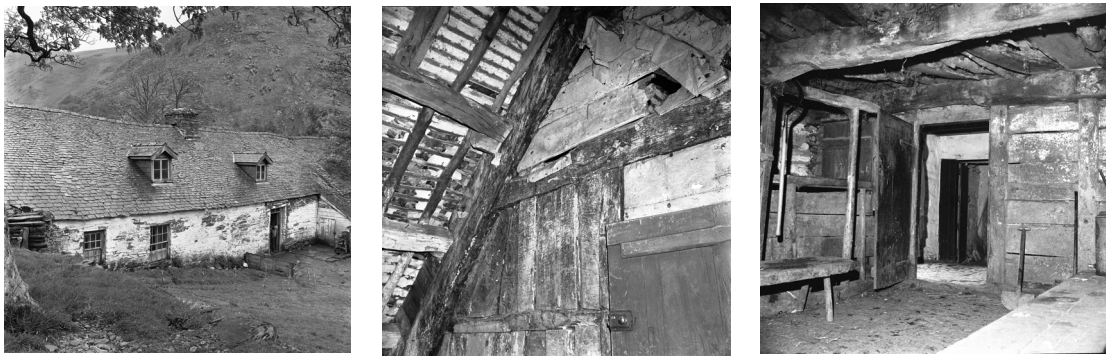


Fig. 8.6 Old photograph of the exterior of Llannerch y cawr; Fig.8.7 Interior view focused on the architectural features of the longhouse; Fig. 8.8 Interior view is absent of humans and animals

Since the establishment of colour photography it has not always been utilised, and the use of black and white images has continued. It is possible this could be because in black and white photography greater contrasts are produced, providing a clearer and stronger architectural image. Considering the importance of colour in the home in the ways in which people have chosen to adorn them, it can be argued that an essential aspect of domestic interiors has been lost through not recording in colour.¹⁰ This is important in the thesis as colour is explored with regard to its associations with tradition.

Cultural evidence

Accounts from literature, poems, paintings and drawings give a more personal view of what life was like at various times. Elements may be distorted and fabricated, but unlike factual documentation, they create a picture of people's views and their everyday life. The

⁹ John Berger, *About Looking* (London: Bloomsbury Publishing Plc, 1980), p.54.

¹⁰ Barnwell, p.17.

descriptions should be taken lightly as they may contain 'many elements of satire'¹¹, though it is probable that descriptions will be based on some evidence that was experienced. Extracts alongside measured drawings can help tell a deeper-rooted narrative.

Paintings of interiors of farmhouses and cottages are rare but provide valuable insights as to how spaces were inhabited through furniture depicted. The fire is often central to paintings, as life revolved around the hearth. They show the positioning of the hearth in the room and give an indication of how people gathered around it. Families' numerous fashionable possessions are illustrated by artists in paintings of cottages, clustered on and around the Welsh dresser and the surrounds and overmantle of the fireplace. In one painting the family bible can be seen on the dresser showing the importance of religion in the home. Many of these paintings greatly exaggerate the true size of the spaces in cottages in an attempt to cram all the family possessions into one picture.



Fig. 8.9 Watercolour of cottage interior, Betws y coed, Carnarfonshire focused on the hearth and appearing out of scale

In contrast to photographs taken for record by the commission these paintings show the way in which dwellings were inhabited and lifestyles of the people, who are often featured in the paintings. They are far from static representations, but are quite informal and evoke the transient and changing state of the home.

¹¹ Eurwyn William, *Welsh Long-houses: Four Centuries of Farming at Cilewent* (Cardiff: University of Wales Press, 1992), p.6.

Contemporary reinterpretation

Contemporary artists' and photographers' interpretation of buildings in the landscape can provide an alternative view and expression of traditional forms. Landscape photographer David Wilson captures buildings in his photography as 'they lend a sense of 'being' to an image – that feeling of homeliness and belonging which appeals to the human spirit'.¹² Some of his works highlight the composition of vernacular dwellings within the landscape, drawing on the shapes elevations compose in the surroundings by creating strong contrasts, reducing buildings to abstract forms. It is 'all about geometric shapes and patterns in the landscape... light and shade, shape and form'.¹³ A sense of isolation of the rural buildings Wilson depicts in his photography and the bleakness of their settings can be experienced. Without people being photographed the buildings become isolated objects or sculptures.



Fig. 8.10 Photography of Aberdeiddi by David Wilson

John Knapp-Fisher similarly represents traditional buildings as objects in the landscape in his paintings, and encapsulates their rootedness within their setting. In his paintings, form is intensified through strong contrasts of light and dark which gives the dwellings a sense of remoteness within the darkness. Devoid of people, animals and objects, the paintings appear fixed in time, but capture the atmosphere of place. It may be relevant for designers to observe and try to draw on the manner and reasoning in which many contemporary artists are attracted to the simple, abstract forms of traditional buildings and the way in which they fit in the landscape. It is useful to observe the ambience and sense of place created in the photography and paintings.

¹² David Wilson, *Pembrokeshire* (Cardiff: Graffeg, 2009), p.63.

¹³ *Ibid.*, p. 16.



Fig. 8.11 Oil painting of an old Pembrokehire farmhouse by John Knapp-Fisher

Precedent studies by contemporary architects who are recognised to draw on tradition in design have proved useful to refer to as part of the contextual study and throughout the design process. In particular the design principles and process in which other architects work in relation to built projects is beneficial to examine to develop an understanding of the diversity of possible approaches to the vernacular that can be followed. From this a designer can develop their own working method and principles to inform their architectural position and approach to design. Elements of design from precedent studies can be used to influence design in various ways and can be interpreted in other contexts.

Personal Observation and interpretation

Alongside the practical technique of measuring, the thesis argues that further personal observations are crucial to develop a holistic understanding of the vernacular environment. It is reasoned by John Berger that 'human visual perception is a far more complex and selective process than that by which a film records.'¹⁴ Atmosphere, character and impression of place can only truly be appreciated through personal experience. Martin Heidegger maintains that it is inherent for people to measure places through their personal daily experiences. This measure through one's surroundings can help to make sense of one's existence. He expresses the restrictions of technological and numerical measure, for more experiential or intellectual human experience.¹⁵ Technical measuring fails to address the complex variables of human emotion. Observation and experience of place can contribute to a broader understanding of place. Artist, Tacita Dean follows a process of 'objective chance' in her works, where she finds meaning through discoveries to inform further investigations in diverse directions. Through drawings, photography, film and sound recording she explores the ways chance and coincidence influence daily life, constructing narratives that connect past and present.¹⁶ The method involves a deeper form of engagement with place that is not logical, but intuitive.

- Connection with landscape and climate

To understand reasons behind pragmatic decisions vernacular builders made in ascertaining the siting and form of dwellings, it is critical to attempt to read the site in the level of detail they would have understood it.

¹⁴ Berger, p.54.

¹⁵ Martin Heidegger, *Poetry, Language, Thought* (London: Harper and Row, 1971), pp. 221-223.

¹⁶ Jean-Christophe Royoux and others, *Tacita Dean* (London: Phaidon Press Ltd., 2006)

Glenn Murcutt explains that the principles he has tried to work with in his designs in Australia are about questions, which are transferable throughout the world. They are simply:

Where does the sun come from? Where does the wind come from? Where does the bad weather come from? Where does the good weather come from? When does it come? When doesn't it come? What is a snowfall, icy weather, what is the topography, what is the hydrology, what is the geothermology? What is the geography, what are the plants, what is the flora, what's the fauna? What's the history? What's the ancient history of the land... right through history, right through to the current time.¹⁷

Once these subtle intricacies of site are understood in terms of climate, habitat, vegetation, geology and topography, the issues of the site can be related to the built form and its details.

Michael Pollen discusses the importance of site selection and positioning, and having to consider many issues. He however reflects from his own experience that you can think too much about the 'uncannily simple' process of site selection and that your senses and intuition can often be the most reliable guide.¹⁸ Glenn Murcutt similarly maintains, 'observation is as important as intuition and discovery.'¹⁹ Intuition establishes measures of significance of elements through the amount of interest paid to certain experiences felt.

Measured drawing and photographs can give an idea about topography and position of a dwelling in the landscape, but not until it is visited can a place truly be understood. Through seeing, drawing and being in a place you can begin to appreciate that these buildings are not simply objects in the landscape as often portrayed in contemporary artists paintings, but are a means of shelter, warmth and comfort, and are a 'modifier of our elements'²⁰. The phenomenological qualities of site can be experienced through seeing, sketching, painting and being in a place. These aspects are considered fundamental in creating a connection between built form and the landscape and site.



Fig. 8.12 Read the landscape - tree warped by the wind

¹⁷ Glenn Murcutt, *Glenn Murcutt: University of Washington master studios and lectures* (Seattle: University of Washington Press, 2009), pp. 17-19.

¹⁸ Michael Pollen, *A place of my own: The Education of an Amateur Builder* (London: Bloomsbury Publishing Plc, 1997), p. 30.

¹⁹ Glenn Murcutt, 'Glenn Murcutt', in *Technology, Place & Architecture: the Jerusalem Seminar in Architecture*, ed. by Kenneth Frampton (New York: Rizzoli, 1998), pp. 56-75 (p. 74).

²⁰ Glenn Murcutt, *Glenn Murcutt: University of Washington master studios and lectures* (Seattle: University of Washington Press, 2009), p. 39.

- Material and making

Vernacular buildings reveal the local materials they were built from and the way in which they were constructed clearly and in a straightforward manner. Whether materials were either extracted from local quarries or collected from fields and rivers can be identified in the stonework. The quality of construction and materials informs us of the wealth of past owners. Materials can express class, differences in localities and even national differences. The structures tell us of the knowledge and skill of their builders. Carpenter's marks on timber frames and cut marks incised into materials by craftsmen add to the story of how buildings were put together and the tools used, which give form uniqueness. The quality, texture and variety of colour of natural and untreated materials used to build traditional dwellings provide aesthetic quality. Imperfections and weathered patina of materials acknowledge the buildings transience and uniqueness, while the construction reflects the handmade craftsmanship. These more detailed studies add an additional layer of information to that already illustrated in measured drawings. It highlights the necessity to appreciate the intricacies of form through materials and construction.



Fig. 8.13 Material textures and aesthetic quality created through construction and building use, Worktop showing marks of use; Fig. 8.14 Horizontal aesthetic created, materials in the construction get smaller towards the top; Fig. 8.15 Combination of large and small stones are use to make the flooring with the smaller stones used to fill in the gaps.

- Form

Principally vernacular dwellings were built of a simple form, primarily for pragmatic reasons. Materials were put together in a straightforward manner and with economy. This simplicity is often depicted in contemporary paintings and written in commentary. The basic elements including the walls, roof and openings, together with the materials they were made from changed very little over time. However dwellings were extended and modified to suit changing needs of the occupants. People made conscious efforts to individualise and decorate their homes in creative ways. Imported styles and trends were added to original forms to express status. Whilst, as David Lea suggests, 'the roots of the tradition do not lie in

form or style, they lie in construction,'²¹ the alterations and identities that people make to their homes should not be ignored. In cases where vernacular buildings are restored, such as at St Fagans, the buildings are often stripped back to their simplest form, and restored to an earlier time, with later alterations and adornments removed. This leads to assumptions that these buildings were lived in by less wealthy peasants, when actually they would have been updated and ornamented over the years, which later photographs and other sources can show.

- Cultural aspects of building tradition

The research in the thesis demonstrates that cultural aspects of building traditions are much more difficult to acquire than the more practical elements of the vernacular. These more subtle aspects of culture require wider exploration in connection with personal observation and experience. Cultural traditions surrounding dwellings have seen to revolve around elements of the home that had both practical and/or symbolic functions. These customs have predominantly surrounded the hearth and thresholds, but also include marks made on surfaces and traditions relating to the landscape. Everyday routines and habits revolved around these key foci together with spiritual rituals. It highlights the importance of certain elements of the house and the landscape which surrounds it. People developed associations and myths around these elements, as they were so critical to their daily lives. Knowledge of these ingrained myths and traditions are often not fully understood as the customs are simply passed down the generations, and the meaning of their existence is lost. It is, however, relevant to look to these myths and traditions as they hold deep cultural meanings and understandings from the past.

Cultural traditions and customs that shaped traditional dwellings in Wales have informed and helped create a sense of place in which they belong. A sense of place is created through the people's connections with their environmental landscapes and qualities involving knowledge, memories and associations. Cultural aspects of building traditions are grounded in their origins and ingrained beyond expression, so therefore require a deeper level of study, relating to the ideas of 'objective chance'.

- Inhabitation

The way in which people inhabit space can be observed through the layout and functions of objects within dwellings. The hearth was particularly significant in defining space. It can be observed how dwellings were flexible and adapted and were modified for new ways of life. Surviving furniture suggests how space was used in the houses. Inhabitation can also be observed through intimate study of a building's surfaces, which indicates how a dwelling has been inhabited and used by the state of materials. The wearing down of buildings emphasizes

²¹ David Lea, 'Fake or Real?', *Planet: The Welsh Internationalist*, 138 (1999/2000), 77-83 (p. 79).

the reality that architecture 'exists through and for its users'.²² 'The built environment is a huge reservoir of situations that tell us about various usages and their interactions with architecture. Attentive observation of existing structures stimulates the observer and nourishes the designer. In other words, wear offers a way of reading buildings.'²³ The home contains pieces and recollections of a multitude of lives that have all made their mark on it over time. Only through explorative personal observations and studies can these subtle details be uncovered.

Summary

Therefore, in order to develop a full understanding of vernacular environments, as Rapoport argues is so critical for contemporary design, a holistic approach to survey must be taken. Built environments should be understood from the beginning of their existence through to the present day. To understand them fully, knowledge needs to be gathered from multiple fields, from historic and cultural evidence through to observations by measured drawings and personal observation. To have a wide understanding of how a built form operated in its lifetime, evidence must be drawn together from a range of periods. It is important to analyse buildings as a whole and also the interdependence of their elements.

Facts and data only tend to be given credence if they are reliable and accurate and when knowledge can be 'proved'. Records that we assume are concrete are still an interpretation and the subject is registered in a certain way. When findings are personal and subjective there is difficulty presenting it as valuable information, as it is only one person's experience of that place. These experiential feelings are however just as important as knowledge from documented and historic evidence in understanding tradition.

Various sources and survey methods shape our understanding of the vernacular in Wales differently. Earlier studies by the RCAHMW where measured drawings of homes are stripped back to their essential architectural features and photographs are devoid of clutter and signs of inhabitation convey a different image of the vernacular to that of a traveller's description or painting of an interior. Assumptions are made surrounding these perceptions. Looking to various sources gives a more rounded way of measuring the vernacular within its surroundings. An understanding of how people interact with their environment is critical as they have shaped the places in which they live and responded differently to external influences on their lives. Personal observations can be used to describe form and character in relation to the environment and sensations connected to it, but they cannot communicate the cultural significance of these things, or their cause for being. A deeper understanding of buildings' history or cultural context is required to support observations and avoid them seeming superficial and naïve. A broad and in depth survey approach allows for a greater insight into the sense of place that has been shaped through people's connections with their

²² People meet in Architecture Biennale Architettura 2010 Short Catalog, p.69.

²³ Usus/ Usures: Belgium pavilion of the 12th Venice Architecture Biennale Booklet

environmental landscapes over time. This deep knowledge of traditions can then be built on and re-interpreted for contemporary design.

8.4.2 Principles

In carrying out the literature and contextual studies and in testing concepts and principles from tradition in design studies it became clear that there is an extensive choice of principles and possible ways of interpreting them that can be translated in contemporary design. Designs drawing on parallel vernacular landscapes can result in very different approaches, showing different levels of precedence to certain aspects of the tradition. Dwellings of the same type share many characteristics and equally contain differing qualities and appearances. In addition to variations in the past, the scope of alternate methods and approaches to design today are even more extensive. A methodology to establish principles to inform design was therefore tested to avoid the designer's decisions being made in a completely arbitrary way and to impose a degree of worth to elements of design.

Initially a framework of principles was drawn up developed from literature and contextual studies. This was useful as it identified the scope of key principles influencing the vernacular. From this a hierarchy of needs was created, which was a constructive tool in identifying significant principles from tradition. However through reflection and analysis of the designs it revealed that the model should encompass an integrated response of all the principles recognised together, rather than a hierarchical response or one where principles are not linked with one another. This was realised as a range of different principles can all apply to a small element of the design. In some cases certain principles contradicted others and caused conflict in the design process.

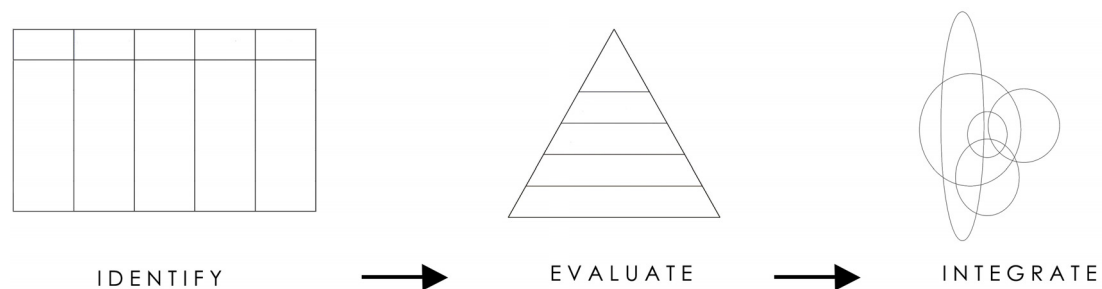


Fig. 8.16 Identify, evaluate and integrate principles to guide the design process

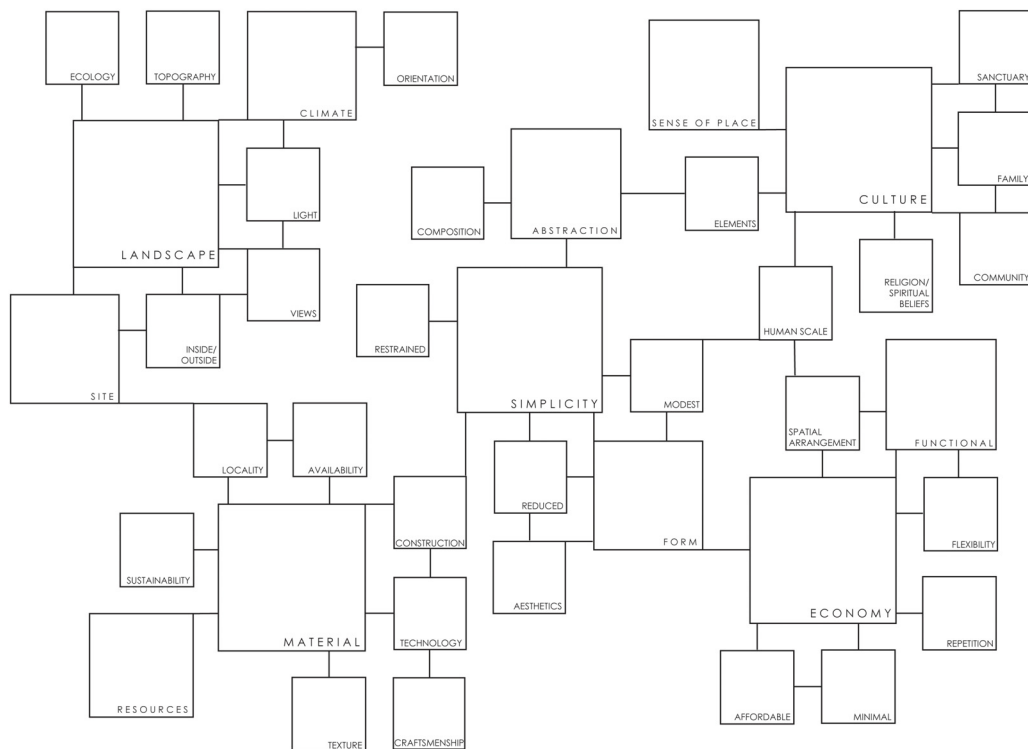


Fig. 8.17 Principles are all interconnected and are related to one another, with some aspects taking precedence over others and being more influential in guiding the design

This led to the reasoning that principles should be applied to give direction and a design should not become dominated by them, as discussed by Lawson.²⁴ As the design studies progressed principles were followed less strictly and considered with reference to one another. It was realised that design therefore should not be carried out to demonstrate principles with every conclusion drawn out by reasoning. Principles should be influencing rather than dictating or prescribed. In practice design is very open as 'most objectives in design are optional in that they can be traded off one against another. There is no such thing as a perfect solution to a design problem; each has its own advantages and weaknesses. Sometimes, objectives seem sensible at the outset but, as the process develops, they prove not to be worth the consequences.'²⁵ It is therefore rational to leave the brief open to a degree and allow the design to be able to adapt and change as issues arise or additional knowledge is gained in the process.

There are also multiple outside influences which affect the design process beyond the application of principles which is not recognised in Rapoport's model. These include the designer's influence, the client, the site and society as a whole, adding greater complexity to the application of principles. The guiding principles therefore require being integrated to a whole series of issues including regulations, standards and costs etc.

²⁴ Bryan Lawson, *How Designers Think: The Design Process Demystified* (Oxford: Architectural Press, 1997), pp.165-166.

²⁵ Bryan Lawson, 'The Art of the Process' in *The Art of the Process: Architectural Design in Practice*, ed. by Louise Rogers (London: RIBA, 1993), (p.8).

In the revised model in the final design, generalised principles extracted from the operational framework are defined and expanded on in detail in relation to the author's architectural position, developed through the research. This was critical to the model as it created greater clarity and direction to design. The principles were then able to be explored and tested further through design. The principles abstracted from tradition included a whole range of aspects of the vernacular, which were applied with greater equal precedence than in the previous designs. This was applied from a conceptual to detailed level to include both generalised principles and specifics of tradition.

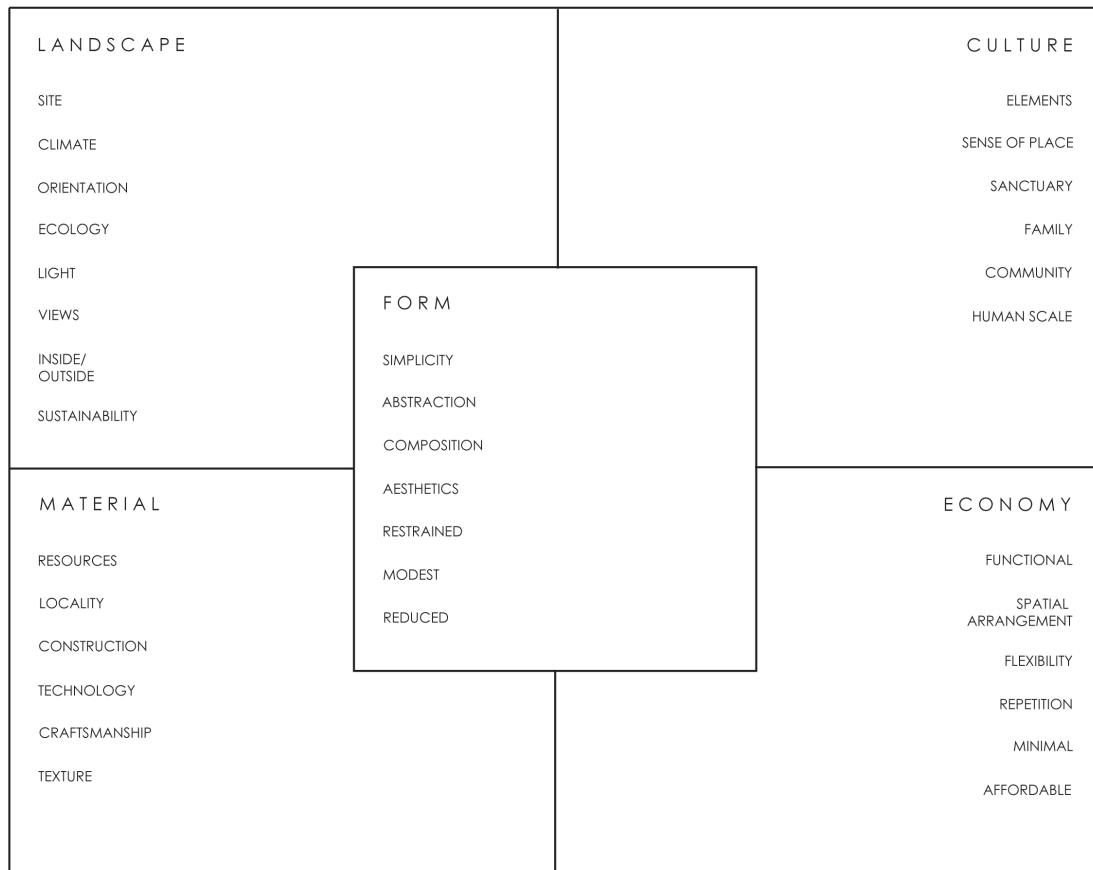


Fig. 8.18 Framework of principles developed and tested in the final design study and applied more holistically and significantly with influence from the author's architectural position

The principles are categorised under five main distinct headings to organise and structure the web of principles connected to tradition and innovation. The central section relates to form and is where the designer has the opportunity to influence the design from their architectural position. These subheadings linked to simplicity of form are specific to the designer of this thesis' architectural position. The top right hand segment on culture is significant to the study and is the part which appears to be least represented in contemporary architecture. This is partly because less research has been done in this area in relation to built form and because application of cultural aspects of tradition are much more subtle and delicate than of matters involving landscape, material, form and economy of means.

8.4.3 Design

The design studies uncovered a difficulty in following a methodological or theoretical approach to design, due to the complexities faced in the design process. Design as a method is diverse as in every situation there are variations and subsequent steps cannot be predicted. It is therefore important to keep an approach open to allow the design to take divergent directions. Lawson describes how 'often any one part of the solution solves many parts of the problem. A single device or element in a building plays many roles and solves many problems, but also in turn creates others.'²⁶ This became apparent in the pilot design study, where principles were considered independently from one another. In trying to resolve design issues, more problems were created and the final outcome was disjointed and ideas it was founded on were disconnected from one another. It was realised that it is necessary to consider principles together, as Bryan Lawson states 'a designer cannot think about one problem at a time. It would be nice indeed if we could simply break design problems down into their constituent parts... it simply cannot be done like that. The need to think about the whole problem, or at least a great number of issues at once, is another of the features that make designing challenging.'²⁷

A model was initially interpreted from Rapoport's model in a simplistic way, where initially a literature review and contextual study was investigated to understand or analyse the problem, from which principles were drawn to inform design, which were subsequently analysed and reflected upon against the original objectives. In reality this sequential process was far more intertwined as during the design stage much research was still being carried out and was evolving alongside the design. The design also questioned some of the principles that emerged from the literature review. The process of analysis and reflection occurred during the process of design – 'reflection in action' and was not exclusively done when the design study had come to an end – 'reflection on action'. This shows that the process of research by design is far from linear and like the application of principles it is critical that the research processes are interconnected in the methodology.

Another significant factor that should be acknowledged is an architects' or designers' intuition and influence on design. It is often described that vernacular builders followed their simple intuition when constructing their environments, so similarly it is fundamental for designers to follow their instincts also. Nigel Cross refers to it as the 'designerly way of knowing',²⁸ which goes beyond logical thought to become designers. Augustin and Coleman similarly recognise 'the important roles that emotion, intuition and experience play in informing the design response' in design as research.²⁹ In the foundation studies, the principles were initially

²⁶ Bryan Lawson, 'The Art of the Process' in *The Art of the Process: Architectural Design in Practice*, ed. by Louise Rogers (London: RIBA, 1993), p.9.

²⁷ Bryan Lawson, 'The Art of the Process' in *The Art of the Process: Architectural Design in Practice*, ed. by Louise Rogers (London: RIBA, 1993), p.10.

²⁸ Nigel Cross, *Designerly Ways of Knowing* (Basel: Birkhauser, 2007)

²⁹ Sally Augustin and Cindy Coleman, *The Designer's Guide to Doing Research: Applying knowledge to Inform Design* (New Jersey: John Wiley & Sons, 2012), p.XVII.

followed functionally and systematically, over addressing the designers own personal feelings and judgements. This subsequently resulted in some unsatisfactory outcomes and on reflection one of the most significant aspects of the design that was absent from the foundation studies was the designer's own influence. The designs were carried out with the objective of creating quite generalised exemplars for design to test the model. However they naturally incorporated much of the author's own personal input, but without the intention of doing so. In hindsight without the author putting their own stance on design, the projects were not completely resolved.

As the scope and choice of the ways in which the vernacular can be reinterpreted is so extensive, it is necessary for designers to incorporate their personal position on how it should be applied to design as part of the guiding principles. The studies of best practice and interviews with designers carried out in the final design study emphasise how where strong initial design objectives and architectural positions were applied to design the built outcomes were more successful. They highlight how the designer's own stance is significant in identifying a unique set of principles from tradition to apply to design, specific to a certain projects and places. As emphasised in the reassessment of the literature and contextual study, a holistic method of design should be employed with particular focus on cultural and experiential aspects of design – the subjective. This could not be achieved without the architect's influence on design, which is not recognised in Rapoport's model.

8.4.4 Analysis and reflection

Through application of research by design it became apparent that it is difficult to apply a neutral, prescribed methodology while working creatively by design, as the process is unpredictable and unsystematic. It is therefore valuable, but also an automatic response to 'reflect in action' during the design process and subsequently 'reflect on action' in conclusion, as discussed by Donald Schön.³⁰

Critical reflection and analysis during the design process proved difficult to document, as the developed skill of designing becomes intuitive. It is therefore hard to describe the process of work that happens naturally. The thought process leads in different directions and the mind is continuously thinking, making it difficult to record. So much knowledge and experience is gathered in the process and there are such a large number of different variables that affect the design process that it is virtually impossible to fully identify and acknowledge them. Critical reflection is most commonly and successfully expressed in the design process of drawing and making itself. However, some notes about thoughts or actions that seemed trivial to comment on at the time, became significant to the overall process once design was reflected on.

³⁰ Donald Schön, *The Reflective Practitioner: How Professionals Think in Action* (Avebury: Ashgate Publishing Limited, 1991)

The role of the experts involved in meetings, design reviews and critiques was crucial to the research process and the model as it gave the opportunity to discuss and analyse the research by design with specialists from different backgrounds. This was in order to continuously improve and build on research already carried out with advice gained. Involvement of people from various research and design areas enabled a balanced consideration of issues involved in the research. However the design reviews were not structured and organised at the same point throughout the designs, as there was a difficulty in getting critics from various backgrounds together at one time. Therefore each design received different levels of input and expertise at varying points in the process. It was difficult to establish when a critique would be most beneficial and there was a tendency to complete a project before the final design review was held. In hindsight additional reviews part way through the design process would have been useful as 'reflection on action'. The unstructured process of design as research is highlighted and the need to take opportunities to review work with others as often as possible is recommended.

In 'reflection on action' it was critical to readdress the literature and evaluate whether the design outcomes correspond with the initial aims and objectives. The designs were compared against theorists' viewpoints and contemporary architects' case studies. This was crucial to the research process and influenced the subsequent studies.

8.5 Re-evaluation of model system

The research reiterates that vernacular design as a 'model system' appears to be a useful generalised theory to apply to the contemporary. However, the actual model itself is difficult to interpret and implement in design. This is because it is too simplistic and it doesn't refer to the process and outside influences that affect contemporary design.

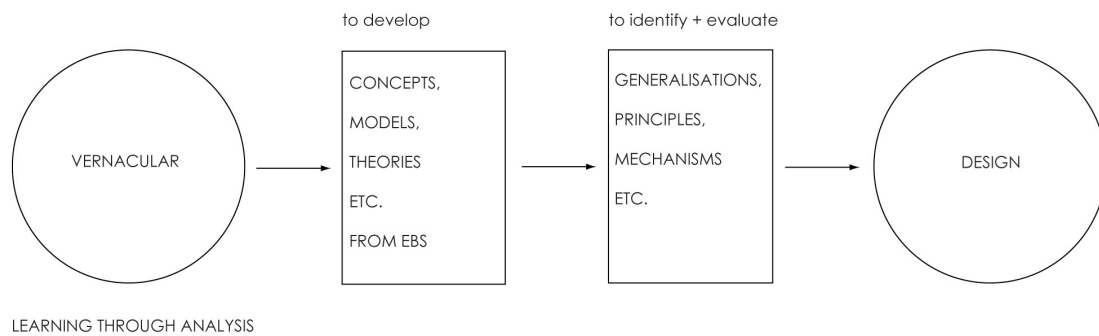


Fig. 8.19 Rapoport's model system of learning from the vernacular through analysis

Rapoport's model suggests that the process is lineal and sequential, however the research highlights that in practice, it is much more complex and the processes of the model are integrated through design. In Rapoport's model, design is the outcome of developing and identifying principles from the vernacular, whereas the design studies conducted in this research suggests that design can influence the development of studies into the vernacular throughout the process.

8.5.1 Vernacular overlay on the RIBA Plan of Work 2013

With the objective to redefine Rapoport's model for use by architects, it is revised to correspond with the RIBA Plan of Work 2013³¹. This is so the model can be developed to provide a more explicit and straightforward practical method to aid design. The RIBA Plan of Work 2013 is a model to illustrate the building design and construction process for use by architects and the construction industry. It is a framework for the organisation and management of building projects set out in work stages. It is a useful framework to relate the model constructed in this thesis to, as it 'details the tasks and outputs required at each stage which may vary or overlap to suit specific project requirements.'³² It also incorporates overlays that can be implemented alongside the RIBA Plan of Work 2013 including the Green Overlay and a BIM Overlay. The vernacular model for design will be applied in a similar way as the Green and BIM Overlays to the Plan of Work, highlighting the tasks required to be carried out and implemented at specific stages of the project. The vernacular model could therefore be

³¹ RIBA, RIBA Plan of Work 2013 <www.ribaplanofwork.com> [accessed 29 September 2013]

³² RIBA, RIBA Plan of Work 2013 Overview <www.architecture.com/Files/RIBAProfessionalServices/Practice/RIBAPlanofWork2013Overview.pdf> [accessed 08 January 2014] 4

overlaid on the Plan of Work and used primarily by architects and designers throughout the appropriate design work stages. It would also be beneficial for clients and all members of a project team to recognise the research and design required at each stage. The principles and tasks could be applied to design in varying degrees depending on the relevancy of particular elements of the model to certain projects in addition to constraints such as time and money.

The new model contains the same elements as Rapoport's model, but they are defined in greater detail and in relation to the work stages 1 – 4 from 'Preparation and Brief' to 'Technical Design' identified in the Plan of Work. Similarly to Rapoport's model, the redefined model involves a wide analysis of the vernacular, through the identification of principles. These are defined in the new model to relate to the work stages of the RIBA Plan of Works. These aspects can be 'learnt', 'experienced' or 'intuitive' and involve study of literature and documentation of both physical and cultural evidence, in addition to practical study through mapping, drawing, modelling, and photography etc., applied through personal observation and experience. As opposed to Rapoport's model where it is illustrated that the study of the vernacular is the initial stage in a linear process, the revised model demonstrates that this is not a sequential process and contextual study happens throughout work stages 1 – 4. The new model therefore attempts to suggest that design doesn't follow a methodical process, but that stages may overlap depending upon the nature of specific projects. Principles also require development over a number of design stages and are interconnected and should be considered together at certain points in the process.

A number of principles are identified in the model from the operational framework in this thesis. They relate to the work stages where they prove most influential to design at various key points in the process. For example, principles relating to landscape and site appear towards the beginning of the process in stage 1 in the 'Preparation and Brief'. They are particularly important in the concept design stage but are also significant in the development of design. Material and construction however become more influential in the developed and technical design. Principles concerning cultural elements of tradition are important throughout the design process from a conceptual level to detailed design.

It proved difficult to formulate a model to illustrate the unmethodical nature of design and the way principles should be interconnected and may have greater or lesser relevance depending on a project brief. The model is therefore quite generalised as every design situation is different and there are additional influences that affect the use of the model such as the designer's architectural position. However the redefined model does offer a more constructive guide to reinterpret the vernacular in design for architects that can be overlaid on the RIBA Plan of Work 2013 as supplementary guidance.

8.5.2 Application of the vernacular overlay

The vernacular overlay could be referred to alongside the RIBA Plan of Work and additional tasks carried out at each stage where relevant to a project. There may be limitations in the model for some projects, but there is flexibility in how it can be used and principles and tasks may overlap the work stages.

In the 'Preparation and Brief' – Stage 1 thorough investigations to understand the site, landscape and culture of a place are required at this initial stage of a project to influence the concept and design processes. This examination could be very time consuming. However certain aspects and principles could be focused on and studied to a greater depth within set time limitations. In the process of analysing the vernacular for design, study may be intuitive, experienced or learnt and the process and knowledge could be built on and transferable to many projects. In addition to limitations of time and cost, there may be a lack of information and resources of a place available. It may also be difficult to frequently access a site or case study buildings to experience and analyse them thoroughly. As identified in the thesis, some of the cultural aspects of tradition are difficult to uncover and may require more time to unearth. Other elements may be lost and comparisons with similar sources may need to be made.

The 'Concept Design' phase – Stage 2 involves an analysis, reinterpretation and abstraction of information and ideas found in site and fieldwork in stage 1. This includes both physical and experiential aspects of building and relationship to landscape and site. Detailed analysis of vernacular buildings specifically examining simplicity of form, materiality and functional and spatial arrangement is also considered in this work stage in preparation for developing the design. Analyses of these aspects of building are more straightforward to investigate as they are physical and based on reason. Development of concepts of siting are more complicated, where phenomenological qualities are considered in addition to physical attributes. There are also added complexities where sites are more challenging. Abstraction and reinterpretation of cultural elements of tradition for the contemporary in the concept design stage is difficult to develop in order to retain meaning from tradition and relevance for the present.

During 'Developed Design' – Stage 3 more detailed design work is carried out and the level of detail typically prepared at this stage may require further consideration to relate specifically to the ideas formed in the previous stages. This includes designing with attention to experiential aspects of placemaking and connection with the cultural and physical environment. More time may be needed to develop design influenced by these objectives. Some elements of the model may not require any additional exploration and design than is usual at this stage, such as creating a simple composition and form. However developing an efficient and functional spatial arrangement may require greater detailed design depending on how far the design is developed to include built in furniture etc. It may be difficult to specify materials and resources which are sustainable in terms of sourcing, availability, locality and durability and

research to find appropriate solutions may be time consuming and a compromise may need to be found.

The final stage considered relevant to the vernacular overlay is 'Technical Design' - Stage 4. This stage involves detailed exploration and specification of qualities and quantities of light in a space and the textural surfaces and materiality. Significantly the affordability of the design will be examined and aspects may need to be value engineered. A significant principle of the model is to design with simple and straightforward construction methods. This proves difficult to achieve economically and in order to meet building standards. It may involve using alternative building methods to those commonly used in house building today.

The model of the vernacular overlay therefore requires investment of time and money in research, significantly in the initial stages of the RIBA Plan of Work thorough contextual study, to reveal the distinctiveness of a place. Further development of design work would also be necessary to fulfil the design objectives and principles set out in the model.



Stages	0	1	2	3	4	5	6	7
Tasks	Strategic Definition	Preparation and Brief	Concept Design	Developed Design	Technical Design	Construction	Handover and Close Out	In Use
Core Objectives	Identify client's Business Case and Strategic Brief and other core project requirements.	Develop Project Objectives , including Quality Objectives and Project Outcomes , Sustainability Aspirations , Project Budget , other parameters or constraints and develop Initial Project Brief . Undertake Feasibility Studies and review of Site Information .	Prepare Concept Design , including outline proposals for structural design, building services systems, outline specifications and preliminary Cost Information along with relevant Project Strategies in accordance with Design Programme . Agree alterations to brief and issue Final Project Brief .	Prepare Developed Design , including coordinated and updated proposals for structural design, building services systems, outline specifications, Cost Information and Project Strategies in accordance with Design Programme .	Prepare Technical Design in accordance with Design Responsibility Matrix and Project Strategies to include all architectural, structural and building services information, specialist subcontractor design and specifications, in accordance with Design Programme .	Offsite manufacturing and onsite Construction in accordance with Construction Programme and resolution of Design Queries from site as they arise.	Handover of building and conclusion of Building Contract .	Undertake In Use services in accordance with Schedule of Services .
Procurement <small>*Variable task bar</small>	Initial considerations for assembling the project team.	Prepare Project Roles Table and Contractual Tree and continue assembling the project team.	The procurement strategy does not fundamentally alter the progression of the design or the level of detail prepared at a given stage. However, Information Exchanges will vary depending on the selected procurement route and Building Contract . A bespoke RIBA Plan of Work 2013 will set out the specific tendering and procurement activities that will occur at each stage in relation to the chosen procurement route.			Administration of Building Contract , including regular site inspections and review of progress.	Conclude administration of Building Contract .	
Programme <small>*Variable task bar</small>	Establish Project Programme .	Review Project Programme .	Review Project Programme .	The procurement route may dictate the Project Programme and may result in certain stages overlapping or being undertaken concurrently. A bespoke RIBA Plan of Work 2013 will clarify the stage overlaps. The Project Programme will set out the specific stage dates and detailed programme durations.				
(Town) Planning <small>*Variable task bar</small>	Pre-application discussions.	Pre-application discussions.	Planning applications are typically made using the Stage 3 output. A bespoke RIBA Plan of Work 2013 will identify when the planning application is to be made.					
Suggested Key Support Tasks	Review Feedback from previous projects.	Prepare Handover Strategy and Risk Assessments . Agree Schedule of Services , Design Responsibility Matrix and Information Exchanges and prepare Project Execution Plan including Technology and Communication Strategies and consideration of Common Standards to be used.	Prepare Sustainability Strategy, Maintenance and Operational Strategy and Handover Strategy and Risk Assessments . Undertake third party consultations as required and any Research and Development aspects. Review and update Project Execution Plan . Consider Construction Strategy , including offsite fabrication, and develop Health and Safety Strategy .	Review and update Sustainability, Maintenance and Operational and Handover Strategies and Risk Assessments . Undertake third party consultations as required and conclude Research and Development aspects. Review and update Project Execution Plan , including Change Control Procedures . Review and update Construction and Health and Safety Strategies .	Review and update Sustainability, Maintenance and Operational and Handover Strategies and Risk Assessments . Prepare and submit Building Regulations submission and any other third party submissions requiring consent. Review and update Project Execution Plan . Review Construction Strategy , including sequencing, and update Health and Safety Strategy .	Review and update Sustainability Strategy and implement Handover Strategy , including agreement of information required for commissioning, training, handover, asset management, future monitoring and maintenance and ongoing compilation of 'As-constructed' Information . Update Construction and Health and Safety Strategies .	Carry out activities listed in Handover Strategy including Feedback for use during the future life of the building or on future projects. Updating of Project Information as required.	Conclude activities listed in Handover Strategy including Post-occupancy Evaluation , review of Project Performance , Project Outcomes and Research and Development aspects. Updating of Project Information , as required, in response to ongoing client Feedback until the end of the building's life.
Vernacular	The vernacular overlay will typically be implemented from stages 1-4. Certain stages may overlap or be undertaken concurrently. Analysis of site and landscape, cultural elements of the building tradition, simplicity of form and construction, economy of means and analysis of materials chosen for practicality, availability, locality and aesthetics. Abstraction and reinterpretation of principles. Development and detailing of principles in design. (See vernacular overlay)							
Sustainability Checkpoints	Sustainability Checkpoint – 0	Sustainability Checkpoint – 1	Sustainability Checkpoint – 2	Sustainability Checkpoint – 3	Sustainability Checkpoint – 4	Sustainability Checkpoint – 5	Sustainability Checkpoint – 6	Sustainability Checkpoint – 7
Information Exchanges <small>(at stage completion)</small>	Strategic Brief .	Initial Project Brief .	Concept Design including outline structural and building services design, associated Project Strategies , preliminary Cost Information and Final Project Brief .	Developed Design , including the coordinated architectural, structural and building services design and updated Cost Information .	Completed Technical Design of the project.	'As-constructed' Information .	Updated 'As-constructed' Information .	'As-constructed' Information updated in response to ongoing client Feedback and maintenance or operational developments.
UK Government Information Exchanges	Not required.	Required.	Required.	Required.	Not required.	Not required.	Required.	As required.

*Variable task bar – in creating a bespoke project or practice specific RIBA Plan of Work 2013 via www.ribaplanofwork.com a specific bar is selected from a number of options.

Fig. 8.20 RIBA Plan of Work 2013 with vernacular overlay

ENTITY	PROCESS			
	Preparation and brief 1	Concept Design 2	Developed Design 3	Technical Design 4
Principles				
Connection to site and landscape Site Landscape Topography Views Inside/ outside Orientation Climate Ecology	<ul style="list-style-type: none"> Engagement with place and detailed analysis of site, landscape, topography, climate and ecology in relation to the surrounding built environment and including analysis of siting of vernacular buildings of the place. To address place in different conditions and times from a wider context of site to intricate details of place. To develop an understanding of the experiential qualities, ambience and character of place. Through mapping, photography, measured drawings, personal observation and human bodily interaction, sketching, drawing and model making. 	<ul style="list-style-type: none"> Analysis of site in terms of views, climate and orientation. To address climatic conditions of site to improve efficiency of built form, but not at the expense of the phenomenological connection between landscape and building, through views and qualities of natural light. These aspects of placemaking should take precedence over climate and orientation. 	<ul style="list-style-type: none"> Develop experiential connections with the surrounding landscape in placemaking, through views of the immediate site and specific markers of the wider landscape. Develop a connection between inside/outside and incorporate the design of spaces with diverse qualities and quantities of natural light throughout the day and through the seasons. Develop the design of the immediate territory of the site connecting with building form and the wider setting with reference to the ecology of the place. 	
Cultural elements of the building tradition Culture Human Community Family Sense of place Experiential Texture Light	<ul style="list-style-type: none"> Analysis of cultural elements of building traditions including myths and traditions surrounding the hearth, threshold, mark making, decoration, colour and the landscape. Analysis of inhabitation of vernacular buildings. Through historic documentation, measured drawings, old photographs, cultural evidence in poems, paintings etc. and personal observation and experience. Develop an understanding of the community of the place. 	<ul style="list-style-type: none"> Abstract and reinterpret cultural elements of tradition for the contemporary. 	<ul style="list-style-type: none"> Develop a sense of place through experiential aspects of light, texture, colour, pattern making etc. to give identity and meaning to place. 	<ul style="list-style-type: none"> Explore further the qualities and quantities of light in space and the use of materials with textural qualities.
Simplicity of form and construction Form Simplicity Abstraction Composition Modest Occupant identity		<ul style="list-style-type: none"> Analysis of the simple form of vernacular buildings. Through measured drawings, photography, personal observation and contemporary reinterpretation in photography and paintings. Abstraction of simple forms 	<ul style="list-style-type: none"> Develop a restrained, modest composition of form. Develop aspects of the design that can be creatively individualised by occupants to give building identity and meaning. Analysis of potential forms of construction that can be applied to design simply in respect to the straightforward and simple means of vernacular buildings. 	<ul style="list-style-type: none"> Simple construction and use of materials. Details designed simply and straightforwardly to give a simple and modest composition and aesthetic.
Economy of means Economy Function Spatial arrangement Security Flexibility Repetition Affordable		<ul style="list-style-type: none"> Analysis of functional and spatial arrangements of vernacular buildings through economy of means. Understanding adaptation, flexibility and repetition of traditional forms. Through measured drawings, mapping and personal observation. Develop a functional brief and a spatial arrangement of form at a conceptual level. 	<ul style="list-style-type: none"> Detailed exploration of spatial arrangement in terms of flexibility, repetition and adaptation of elements of design. Economy of means through efficient use of space, designing effectively but to a minimum. Organisation of space including the detailed design of space and placemaking considering security, in addition to the opportunity for flexibility and multifunctional use of space to provide a variety of places to inhabit. Consideration of affordability of aspects of design. Develop design to fit to a standard grid and structural arrangement for efficiency and economy. 	<ul style="list-style-type: none"> Analysis of the affordability of aspects of design. Adopt standard methods of construction which can be built by local builders. Use of inexpensive materials and experimentation with the application of them. More costly elements can be specified in smaller quantities to emphasise the importance of aspects of design. Develop the design with consideration of whole life costs, including durability of materials, maintenance and energy consumption. Fittings/fixtures to be easily replaceable and repairable.
Materials chosen for practicality, availability, locality and aesthetics Construction Materials Resources Sustainability Technology Locality Craftsmanship		<ul style="list-style-type: none"> Analysis of materials used in vernacular buildings specific to place in terms of practicality, availability in the locality and aesthetic qualities. 	<ul style="list-style-type: none"> Consideration of materials used which can be used in construction simply and straightforwardly. Consideration of materials and resources that are sustainable in terms of sourcing, availability, locality and durability. Consideration of materials for aesthetic and textual qualities that contribute to the development of placemaking and a sense of place. 	<ul style="list-style-type: none"> Develop design of a construction system that is simple and straightforward and uses materials considered most suitable for the application. Incorporate elements of craftsmanship reappropriated from tradition. Consideration and incorporation of new technologies.

Fig. 8.21 Rapoport's model system re-evaluated and redefined against the RIBA Plan of Work 2013

8.6 Further work

The thesis has developed a number of findings, which have progressed the author's design development. However further work beyond the scope of this study would be beneficial to widen the access of this research to designers, architects, planners and people involved in the housing sector. It would be valuable to develop the study by getting architects and designers to test the revised model by applying it to the design of actual building projects. This would aid in identifying how successful the application of the model may be in practice and whether there is a need to refine it further.

It is realised through the design studies that the investment of time required to truly understand traditions of a place is substantial and in reality there are limitations in carrying out such a thorough analysis of the vernacular in practice. This is due to restrictions of time to explore various aspects of site and tradition and due to the costs involved. It is recognised in the thesis that detailed observation is required in order to uncover the implicit peculiarities of a place. It argues that recognition and emphasis of these specific characteristics of tradition add meaning and are crucial in creating design which is responsive to place. The research demonstrates that these elements are harder to uncover and require time to identify. The study therefore highlights that in order to design built environments that are responsive to place there is a need to invest more time and money into the initial stages of the RIBA Plan of Work thorough contextual study. In addition, it is realised through the design studies that greater investment in housing is required, in order to create communities which will endure and homes that are long-lasting and relate to their surrounding environment.

The research lacked a detailed analysis of cost throughout the design process, which was due to the limited of knowledge and experience of the author. The study therefore relied on others to guide in cost analysis. Further exploration of this would aid in developing more applicable cost effective solutions that could be implemented in affordable housing design.

The research also highlights contradictions in guidance and legislations in housing. A range of different standards are required to be met in the design of affordable housing in Wales. These include Building Regulations, Welsh Assembly Government Development Quality Requirements, The Code for Sustainable Homes, Lifetime Homes, Secured by Design and RNIB accreditation. Conflicts exist between the documents and the standards set out inhibit the designer from being able to explore some aspects of vernacular traditions argued in this thesis to still be relevant. This particularly applies to space standards which are too rigorously defined for concepts relating to spatial arrangement and experiential aspects of design to be able to be considered and implemented in built form. In order for design of social and private developer led housing to adopt principles from the vernacular for design of the contemporary Welsh house and to continue traditions handed down from the past, some of these issues must be addressed.

In order to make the research comprehensive to architects to apply to design in a range of contexts, the production of a housing design guide based on the principles of the vernacular determined in this thesis could make the model more useable and accessible. This could supplement the current Design Guide for Residential Development by the Planning Office Society Wales and build on the refined model established through this research. It could also address some of the restrictions in standards and propose how they could be confronted. A design guide could have the potential to be implemented by designers in Wales and it could also be transferable for use in other geographical environments.

This research therefore provides a method for designers to adopt in diverse environmental contexts, as a guide for design which re-appropriates the vernacular and is responsive to place, based on Rapoport's model. This thesis focused in Wales offers the opportunity to carry out cross cultural studies with other contexts, to establish common grounds to develop and extend the study of the vernacular as a 'model system' in further research by design.

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