Between Country and Town: New Concepts in Sustainable Rural Housing

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Abstract

One of the results of the UK's housing policies over the past 50 years has been the proliferation of private, suburban housing estates. These are based around similar lifestyle models, low-quality spatial planning solutions and short-term, low-cost construction technologies. This practice disregards regionally distinct cultural and climatic contexts across the UK. It is widely recognized that standardised approaches to house building have been responsible for the poor quality place-making evident in suburban type countryside housing estates. These new developments lack the intrinsic sense of identity and richness that has historically given rural settlements their unique character and quality. Moreover, the communities that result from this type of development are intrinsically unsustainable; proliferating high-carbon lifestyles. The suburbanisation of rural Britain appears to have no end considering the UK government's target of building up to 290,500 new homes per year to achieve the goal of 3million new homes by 2020. It is now critically important that alternative, more sustainable, low-carbon housing models are envisaged which can be used as the basis for the conceptualization and development of more appropriate forms of housing that will inherently support new types of sustainable communities. This will inevitably require a step change in thinking to the provision, design and technology of new-build private housing in the UK. The following paper explores four strategies for a new sustainable development of low energy houses in a traditional village in rural Scotland. Anchoring, Court, Street, and Croft encapsulate these principles in four new models for the design of more sustainable housing in the Scottish countryside.

Keywords: Zero-Carbon, Housing, Sustainable, Community, Rural, Suburban

1   Rural Housing Context in Scotland

1.1 Housing Requirement in Scotland

UK Government targets aim to provide a significant increase in private and social housing over the next five years (Moya, 2009). The predicted population increase and shift from the social sector to private home ownership in Scotland along with the need to replace existing poor quality, inflexible post-war housing and the requirement to meet impending technical standards aimed at reducing the carbon footprint of new development, are the main reasons for the increased housing requirement. The other major factors that contribute to the problem are the increasing waiting lists of people in sub-standard accommodation, an ageing population and the need for affordable home ownership for young couples and families. In Scotland the majority of this new housing will be absorbed within new communities on Strategic Land Allocations associated with existing major towns and cities. However, there is a significant proportion of housing to be provided in rural areas to help support and bolster the rural economy.

1.2 Problems of Suburban Housing

Over the last two decades the majority of new housing has been provided by the commercial sector, resulting in developer-led standardised suburban housing estates on green field sites (Figure 1). There is a concern that the commercial sector's response to the Government's new housing targets will continue this trend. It is widely recognised that this approach has been responsible for poor quality spatial planning and uncontrolled sprawl that results when farm land becomes available for purchase (Anon, Scottish Office 1994). The form of these developments is driven by the need to provide each house with an individual plot of land with front, back and side gardens. Plots are organised around road layouts with loop systems and cul-de-sacs based on the primacy of the automobile. The resulting density is not urban or rural; rather, it sits somewhere in between: a no-man's-land of poor, ill defined thresholds and ambiguous spaces (Bates, 2007).
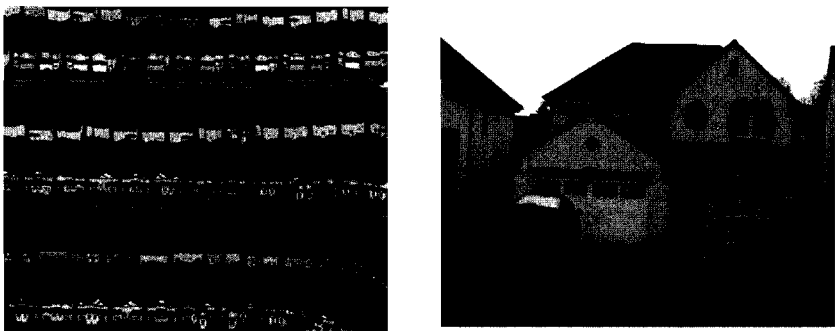

Figure 1. Typical developer suburban housing.

A principle concern with suburban housing has been the way in which new developments of this type respond to their context. In 2001, Scotland launched its first national policy on architecture and planning: 'Designing Places', intended to help raise standards of urban and rural development (Cowan, 2001). A key principle of the policy has been to ensure that new housing design considers the local vernacular (Figure 2). The Scottish Government's Directorate for the Built Environment stated that the way in which the new built environment can respond to issues of national and local identity and to its built heritage should form an important part of Scotland's policy on architecture. This has subsequently been reinforced in various Planning Advice Notes (Anon, PAN 72: PAN 44). However, the way in which this policy has been addressed and the resulting quality of the architecture produced has been widely criticised. In particular, it is recognised that this form of regional design control has led to a narrow interpretation of the historic built environment based solely upon a visual survey of prevalent historic materials and forms (Maudlin, 2009). This has tended to produce a neo-traditional domestic architecture that safeguards the memory of a specific time and culture (Figure 3) (Naismith, 1985). The resulting developments demonstrate little of the culture and values of contemporary society or how the architecture responds positively to a contemporary context. To date, little account has been taken of new pressing environmental legislation, changes in construction practice and the changing demographics of housing (Sheerin, 1990). The question of addressing the need for distinct and appropriate character in place-making is one which needs an alternative approach: based not on a visual aesthetic interpretation of historical form; but rather, one where the form results from a deeper understanding of the underlying cultural, environmental and economic drivers and their distinct regional differences (Bain, 2008). The appropriateness of the resulting architecture should be measured against a broader framework – where it is considered in relation to its contribution to generating intrinsically sustainable communities – rather than a superficial visual aesthetic response (Anon, Firm Foundations, 2007).

Figure 2. Black House: Scottish vernacular architecture of the Western Isles.

Figure 3. Poundbury, England: an example of neo-vernacular new town planning.

1.3 Zero-Carbon Housing Context

Passive and active design strategies are used in the development of low energy houses. Although the basic ideologies of conserving energy are widely known, research and development in various countries have led to different interpretations of the low energy house (Hastings & Wall, 2007). National Labels across the globe have been created to standardise and promote best practice in low energy demand housing such as Passivhaus (Germany), Minergie (Austria / Switzerland), LEED (United States/Canada) and Code for Sustainable Homes (UK). The UK Government has established the need to take action towards developing zero carbon homes and aimed to make all new homes zero carbon by 2016 (Anon, 2006). The Code for sustainable Homes (CSH) sets the parameters and national standards for the practice of low energy and zero carbon housing. The CSH system works by creating levels (1-6). The higher the CSH Level achieved, the more energy efficient the house, with CSH Level 6 being zero carbon. Achieving a CSH Level is dependent on how many points a proposal earns with criteria ranging from technical considerations to more community centred issues. CSH level 5 and 6 solutions such as the Sigma House (Figure 4), the Lighthouse (Figure 5) and Prince Charles' Natural House (Figure 6), are currently being developed and tested at the UK's Building Research Establishment. However, the vast majority of new housing throughout the rest of the UK is presently built to CSH Level 3, making the proposed achievement of CSH Level 6 by 2016 questionable (Jury, 2009).
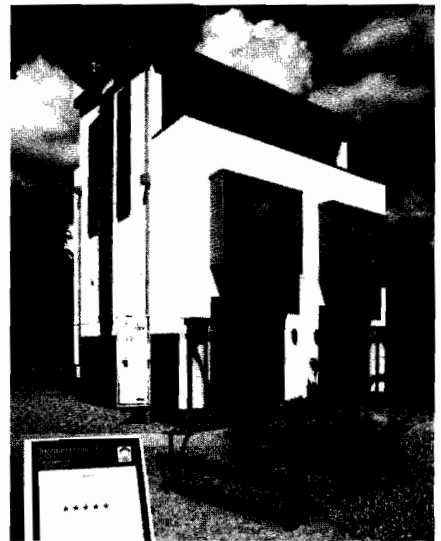

Figure 4. Lighthouse.   Figure 5. Sigma House.

Figure 6. Prince's Foundation Eco House.

1.4 The Need for Alternative Rural Development Models

The relationship between new suburban developments and existing rural communities is often a parasitic one. The majority of new development caters to the needs of the commuter; hence, they contribute little towards the economy of the countryside. The promulgation of high carbon, mono-cultural, commuter lifestyles invariably leads to a shift in demographics within existing rural communities (Barker, 1999). These issues have lead to strong arguments against the development of new housing in existing rural areas whilst reinforcing a view that rural development is simply unsustainable (Young, 2010). Specific factors against rural development include:

- Historic rural communities are low-density whereas contemporary sustainable practices rely on higher density developments.

- Modern society values leisure time as opposed to the notion of self-sufficiency. Hence, traditional farming is out of step with contemporary aspirations.

- Business development within rural communities is remote from markets with inherent supply chain issues.

- People living in disparate rural communities desire the same level of amenities as their urban counterparts; however, the provision of services to these communities is a greater burden on the environment.

- Most newcomers to rural areas usually have a romantic view of the countryside but this is often at odds with the realities of rural life.

Historically, the majority of Scotland's population lived and worked in rural areas and it is only comparatively recently that there has been a shift towards an

urban culture where the majority of people live and work in cities. This change has resulted in a gradual decline in traditional rural settlements. However, the advent of new communication technologies and the development of more specialised forms of industry and agriculture can provide opportunities to revitalise rural areas, stimulate new economies and develop new cultures in line with the Scottish Sustainable Com munities Initiative (Neil, 2010: Anon, SSCI, 2008). To address these opportunities there needs to be more strategic and qualitative thinking at planning (Macro), architectural (Intermediate) and technological (Micro) levels. This means that the desire to create more sustainable, economical and qualitative approaches to living coupled to the more stringent requirements of new place-making and energy legislation cannot be met by existing suburban development models. Therefore, more diverse communities will require alternative forms of housing of all tenures with mixed land uses and economies to realise their full potential (Richards, 1994: Cousins, 2009: Levitt, 2010). Although this problem is not limited to Scotland, the uniqueness of the Scottish context arguably requires special attention and if dealt with appropriately could form a model for thinking and development elsewhere. The principle problems in housing that need to be addressed are:

- Macro: inflexible pattern book urban layouts that fail to respond adequately to specific physical and social contexts;

- Intermediate: house typologies that are out of context with existing settlements and changing lifestyles;

- Micro: construction and energy practices based on cost as opposed to the promotion of healthy, sustainable communities.
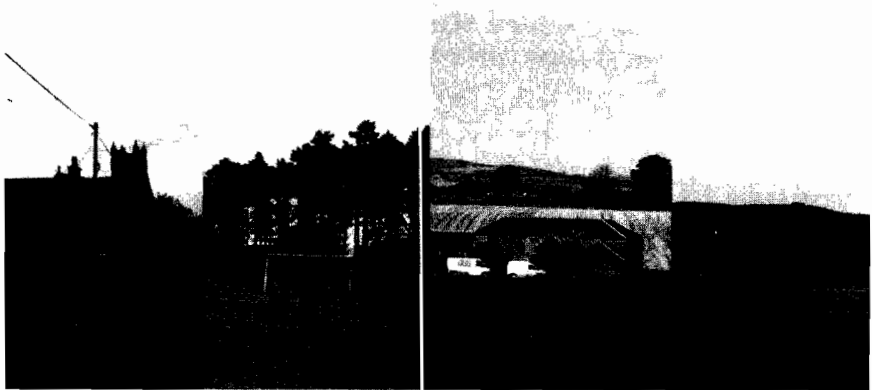
2   Research Context

Figure 7. Meigle: site character.

2.1 Location and Political background

The village of Meigle is a classic example of a Scottish rural settlement (Figure 7). The site for the research is an area of farmland adjacent to the village which was the subject of a rejected planning development application submitted by a volume house builder in 2007 (Figure 8).
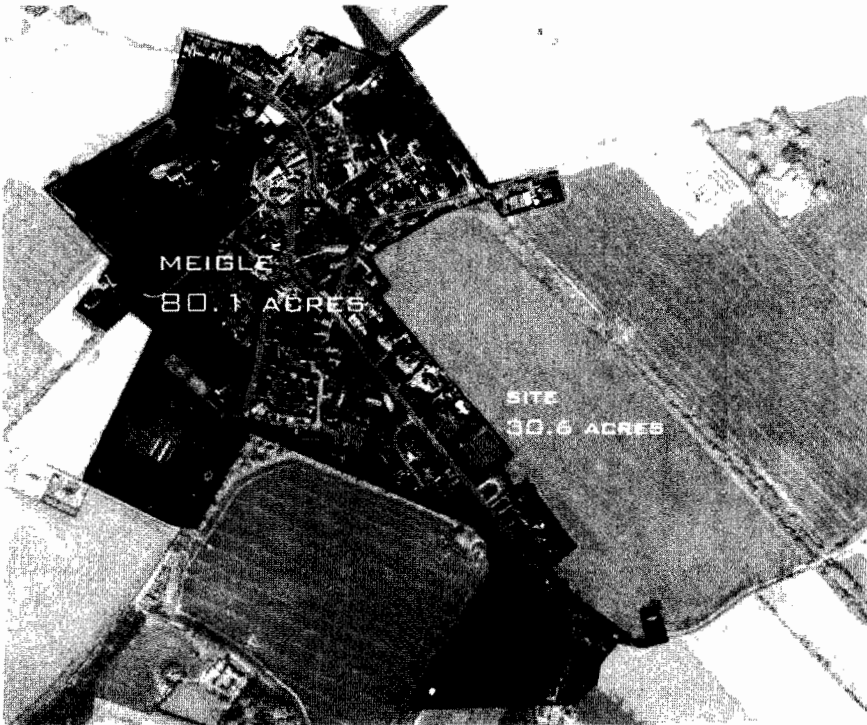

Figure 8. Meigle site plan.

The application had been rejected on the grounds that the development would have had a lasting, detrimental effect due to the anonymous suburban nature of the proposal. However, the community council is not averse to increasing the population of the village as they recognise the importance of new development to secure the economic future and vitality of the community. Hence, the Meigle Profile, an informative guide for planners and developers, was produced to help guide decisions on current and future developments in and around the village. The primary aim of the document is to allow Meigle to continue to change and grow, but in a manner that would be in sympathy with its own particular identity. The Meigle Profile became the catalyst for the Rural design scenarios outlined in the pages to follow.

2.2 Research Methodology

The aim of the research is to explore, through analytical and qualitative studies, a design based approach for the development of alternative strategies for sustainable low-energy housing development. The research was undertaken by the Macro-Micro Masters Unit of the University of Dundee School of Architecture and was based on methodologies established by the RIBA/CABE in their study of future housing predictions 'Housing Futures 2024' (Worthington, 2004). The aim of the study is to develop potential scenarios for future rural housing development responding to current and future Scottish policy frameworks. The objective of the research is to stimulate the debate around the provision of appropriate models of rural development. Operating from the Macro scale to the Micro scale and incorporating One Planet Living principles, the scope of the research was wide ranging; encompassing occupant lifestyle patterns, energy generation and conservation, food supply, waste-management and construction systems and urban planning strategies (Francis & Wheeler, 2006). The net result was four distinct design proposals for new typologies of rural development. Analysis was carried out under the following key subjects of study: Society, Townscape, Density and Character.

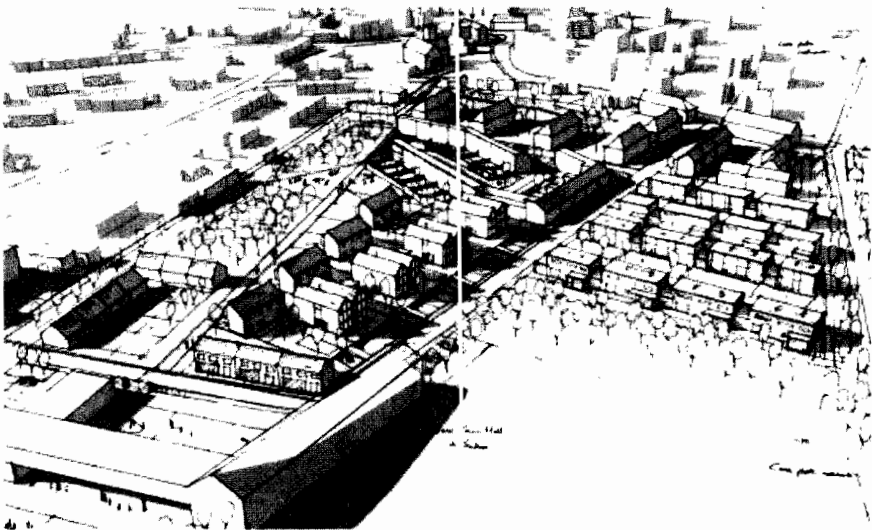## 3   Rural Design Scenarios

3.1 Anchoring

Figure 9. Scenario 1: Anchoring. Master plan, aerial view.

Anchoring reconciles the suburban dream of house and private garden with more traditional urban town planning concepts (Figure 9) (Krier, 1984, 1993, 1998). It incorporates higher densities than suburban counterparts through tightly

defined and closely controlled spaces which reflect the character of the existing village. The new development anchors itself to the existing village through infrastructure, programme and built form. This is achieved by extending and repairing historical roads and pathways, developing mixed-use housing clusters and controlling external spaces. Varied identities, spatial scales and materiality reflect the richness of the existing village. Two main routes – one pedestrian, the other vehicular are used to organise the house clusters. The proposed school and community hall create a civic termination to the development, reinforcing social links with the village. Hierarchies of courtyards, pedestrian links, mews and gardens are clearly zoned to aid way-finding, a known problem with suburban layouts. The housing typologies vary across the site with rows, semi-detached, detached villas and retail, creating a diverse mix of tenure. These absorb new construction and energy strategies using simple associative vernacular forms. Open green spaces and deciduous tree plantations serve as wildlife corridors and connect with existing pedestrian path networks. A SUDS pond and associated channels along pathways filter grey water. Septic tanks and reed bed pools are used to treat black water. Combined heat and power is provided from biogas harvested from farm waste. Sustainable construction materials are employed throughout.
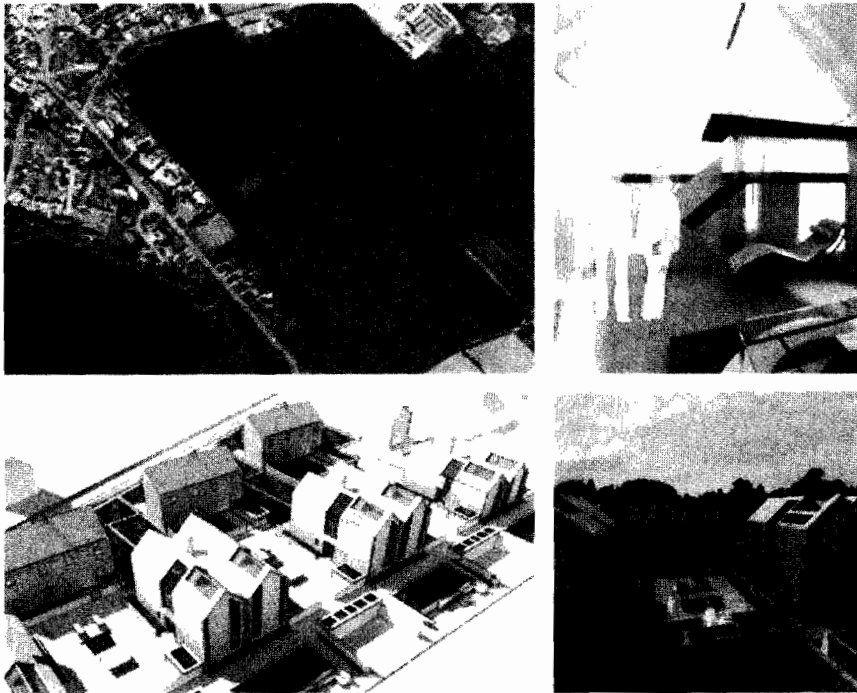

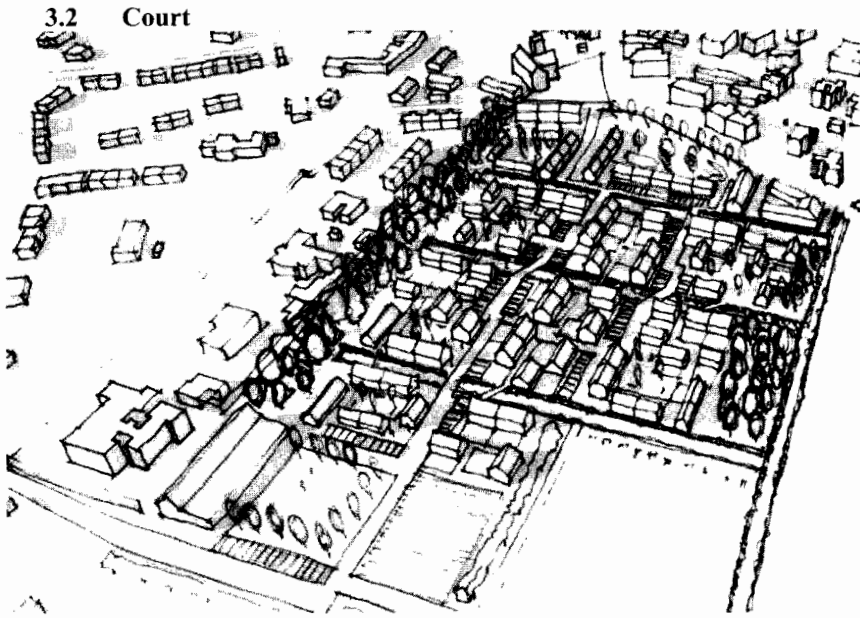Figure 10. Scenario 1: Anchoring. Site plan and perspectives.

3.2   Court

Figure 11. Scenario 2: Court. Master plan, aerial view.

Court is based on a cluster of 12 houses grouped around a number of interwoven public spaces to create a community unit (Figure 11). Each cluster is derived from Christopher Alexander's rules pertaining to the maximum number of people that can have a conversation around a table, thus engendering a recognizable social scale and order (Alexander, 1977). The eight courts that make up the development each have unique spatial organisations to give individual identity to clusters and variety to the masterplan. The sequence of open, contained and shared spaces introduces a hierarchy of ownership. Inter-cluster interaction is encouraged by placing different community facilities within each court. The courts are embedded within a hierarchal Cartesian matt of streets, paths and waterways. Streets incorporate shared pedestrian and vehicular surfaces giving access to parking bays adjacent to fully pedestrian courts. Landscaped waterways running perpendicular to the streets, serve as pedestrian connections between courts as well as inhabitable green spaces for services, SUDS and wildlife. Diversity is created by varying the housing typologies using single and two-storey detached and semi detached units surrounding each court. Each house has a specific relationship to the court, responding to urban, human scales and passive environmental considerations. Energy strategies at the community scale are based on wood fuel CHP from local forestry and suppliers. Individual houses utilise sustainable, low-energy technologies and materials. (Figure 12).
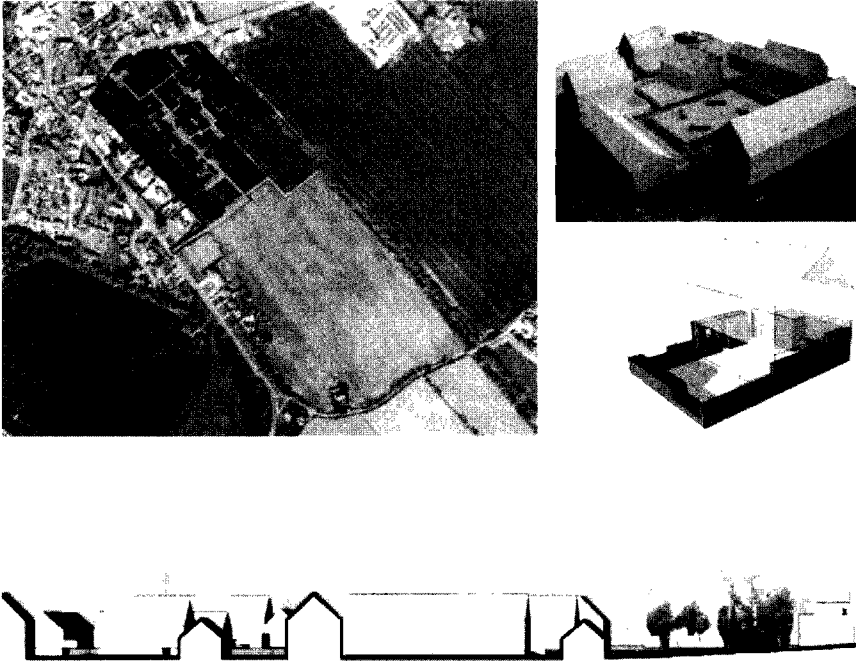
Figure 12. Scenario 2: Court. Site plan, models and section.
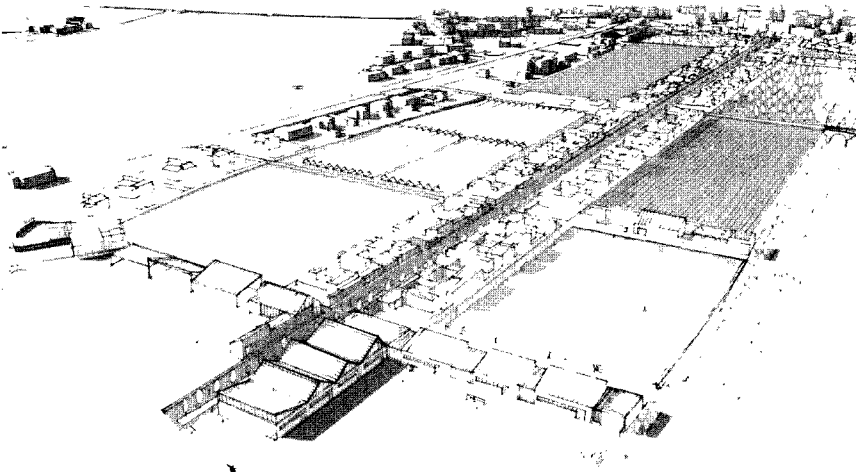
3.3   Street

Figure 13. Scenario 3: Street. Master plan, aerial view.

The medians of street, wall and field respond to the rural context by interweaving the relationships between farming and contemporary living (Figure 13). The design is derived from principles established in Borneo Sporenburg, Amsterdam and offers a vision of urban living tuned to an aspiration by many to live in the countryside (Cousins, 2008). Reminiscent of the existing Victorian extension to the village, the street forms a spine along which sits a matt of densely built infrastructure driven unremittingly across the site. The houses form a solid wall along the street and field boundaries. These walls are punctured by tightly controlled and defined external courtyards and patios around which the main social spaces of the houses are arranged. The social spaces of each house have a fluid relationship with the main external spaces: street, field or patio. Houses and patios vary in scale depending on family sizes, giving richness and variety to the street. The limited palette of materials, in particular the brown brick which is associated with the red ochre colour of the fields, brings uniformity and order to the built infrastructure which is pierced at varying intervals by community parks and orchards. These civic spaces also collect perpendicular pedestrian routes that link into key nodes within the village and core path networks. The lateral path network defines a strict grid for the small-scale subsistence farming plots. A farmers market to the south of the site provides an outlet for local produce whilst stimulating cultural exchange between the existing village and the new development (Figure 14).
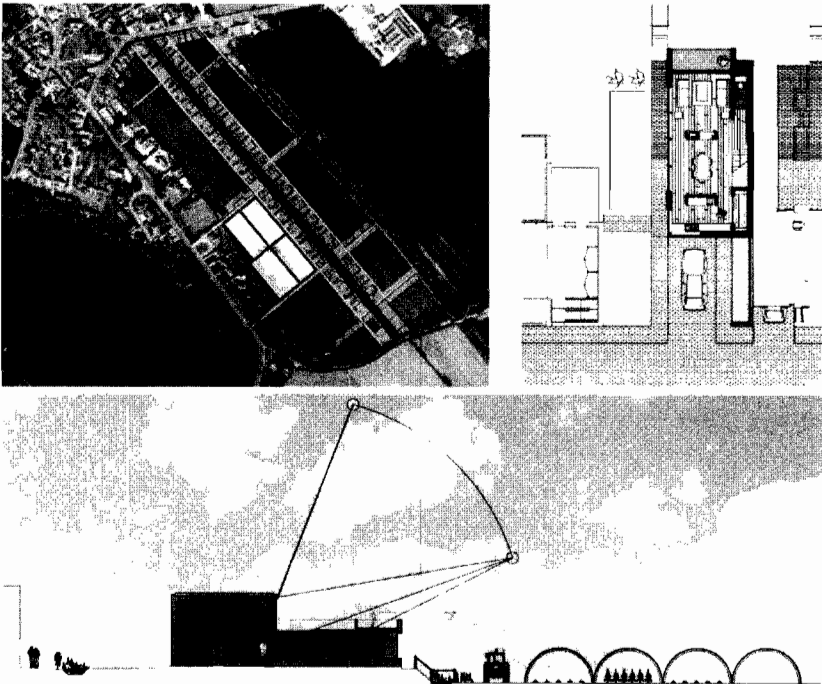

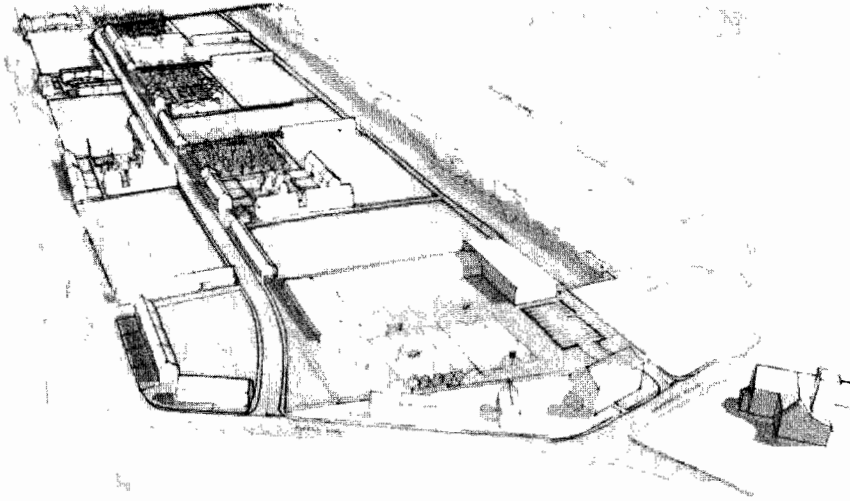Figure 14. Scenario 3: Street. Site plan, house plan and section.

3.4 Croft

Figure 15. Scenario 4: Croft. Master plan, aerial view.

Croft is a self-sustaining low intensity farming community with mixed land-uses containing small scale subsistence farming plots, densely developed steading-type housing clusters, community green spaces, allotments and orchards (Figure 15). It addresses government agendas for re-establishing crofting: an indigenous system of small-scale subsistence farming, once widespread throughout Scotland but now in decline (Burns, 2007). Crofting has many benefits as it keeps communities alive, enables people to live and work in isolated areas, and helps keep rural schools and other vital public services operating. Crofters traditionally use low intensity management techniques and sustainable farming practices which helps to encourage wildlife and create unique landscapes and habitats. It also sustains a rich cultural heritage reflected in its legacy of language, music, song, dance, poetry, storytelling and literature. In order to survive in the 21st century as a sustainable and productive use of land and as a living culture, crofting needs to be reinvented to encourage young people to take it up as a way of life. The Croft masterplan is based on an irregular grid of one-acre farming plots which could provide a sufficient quantity of food to sustain a family for a year with surplus income capacity to sustain other needs appropriate to more contemporary lifestyles. The plots are woven within a framework of roads, trackways and footpaths. Social and physical networks between crofts, steadings and the existing village create a self-sustaining market for swapping and selling produce. Each croft consists of arable land, storage sheds and a house. Steading clusters of nine dwellings, adjacent to the crofts, provide affordable home ownership. The internal courtyard serving the steading houses contains shared gardens, patios and allotment spaces. The internal layout design of a typical two bedroom steading house groups the vertical circulation and wet services within a core. This arrangement permits free-plan flexibility for the rest of the house to allow the end user to inhabit the

space as they wish. The energy strategy for the houses uses simple passive means, thermally active construction systems and high levels of insulation. Space heating, domestic hot water and electricity generation are addressed at district level (Figure 16).
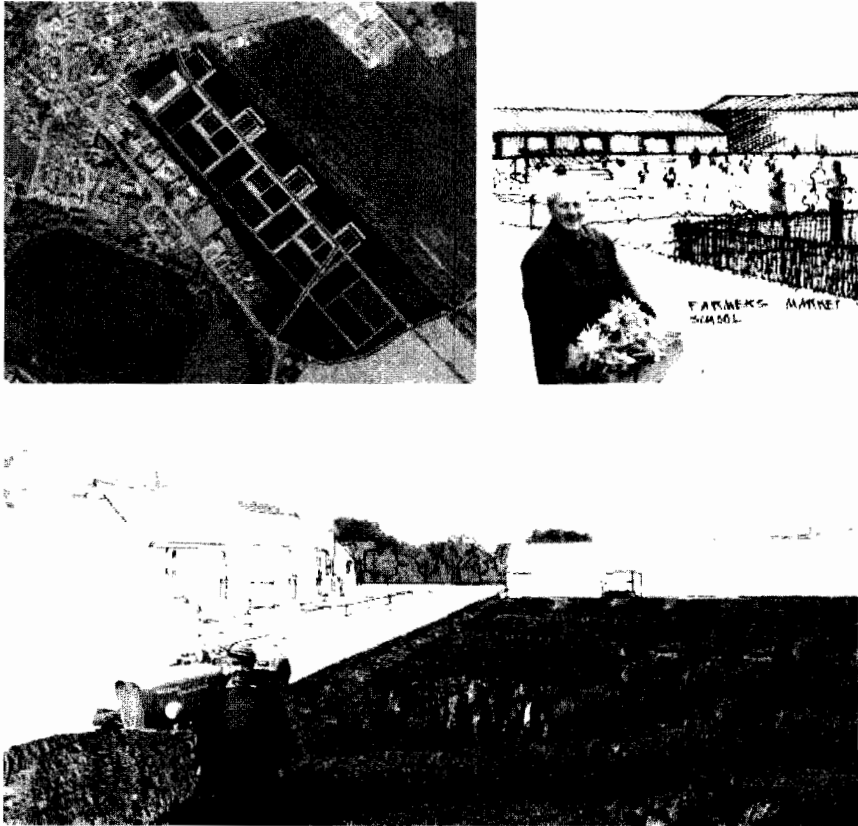

Figure 16. Scenario 4: Croft. Site plan and perspectives.

4   Conclusions

The development of more sustainable, economical and qualitative approaches to rural living will need the formation of more diverse communities. Alternative forms of housing of all tenures with mixed land uses and economies are needed to realise the full potential of a community. A deeper understanding at regional and individual levels of the underlying cultural, environmental and economic requirements of communities may generate more appropriate development frameworks and architectural responses to low-carbon rural living. Anchoring,

Court, Street and Croft contain four sustainable strategies for development within a Scottish rural context. Anchoring and Court centralise development adjacent to the village core, extending the village boundary, whilst stitching into the existing fabric. Both proposals leave the remainder of the site for agricultural uses and develop typologies based on more accepted urban frameworks. Street and Croft disperse development across a wider area of the site, developing a typology of land use within a broader framework of sustainable development that has farming as a key generator of form. Whilst the proposals take very different approaches, a number of common architectural issues have emerged from the study. Density and intensive use of land are needed to create clearly defined hierarchies and high quality external spaces. In all schemes, clustering of the built fabric allows very precisely controlled public spaces with clear boundaries and thresholds to be produced whilst achieving higher densities than suburban models. The perception of enclosure (and therefore density) is generated by the boundaries (walls, hedgerows and forest). A more intensive use of land pockets relieves pressure on remaining land which can be released for alternative uses: green-space, wildlife corridors, swales, waterways, farming and allotments. An ordered landscape framework, based not on the primacy of the car, but on alternative land uses can achieve a scale of association with the existing rural landscape with built densities more in-keeping with the existing village. An abstracted order does not replicate the organic formation of the village but seeks rules based on underlying factors more in keeping with contemporary requirements whether these are urban or rural. Identity and character can be achieved by the sensitive manipulation of the built fabric and landscape.

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