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Appendix 3 to Additional Sustainability Appraisal of North Essex Section 1 Local Plan

Evidence review on urban form

Prepared by LUC
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Linking the Urban Form of New Development and Sustainability Outcomes

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July 2019

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1 Introduction

1.1 'Urban form' refers to the physical characteristics that make up a built-up area. It evolves continuously, *"in response to social, environmental, economic and technological developments, mediate by policies in numerous sectors"* (Williams, 2014, p6).

1.2 The evolution of urban form, and the policy decisions that lie behind it, have been recognised as having far-reaching implications for sustainability outcomes. This has led to ongoing (and heavily contested) debates about how to achieve the 'best' urban form - most recently, this has brought a focus on 'sustainable' and 'resilient' urban forms (Williams, 2014, p10).

1.3 There is growing consensus that sustainability cannot be achieved through technological solutions alone (Harris, 2018, p.25) and that settlement patterns must be carefully considered and guided for their sustainability impacts. However equally, there is a growing understanding that we should not be seeking a single 'model' for the future, but rather *"looking for the benefits of a range of different urban forms, or futures, and ensuring they function for different groups"* (Williams, 2014, p28).

1.4 This brief review focuses on three major typologies of urban form that are often considered when planning for the delivery of housing and employment land in the UK, in order to meet ambitious targets and to satisfy growing demand. These are directly relevant to the SA of alternative spatial strategies for the North Essex Section 1 Local Plan. The three major typologies considered are:

- **New settlements:** understood as free-standing new settlements (sometimes taking the form of 'eco-towns', sustainable communities, new towns, garden cities/villages etc.). This review builds on the thresholds set out by an existing study for Aylesbury Vale District Council (, to understand a 'new settlement' as one that is either remote from existing settlements or that enlarges an existing community by over 50% of the population or dwelling stock;
- **Urban extensions:** understood as planned extensions on the edge of existing towns or cities that enlarge an existing community by less than 50% of the population and dwelling stock;
- **Dispersed development:** understood as more *ad hoc,* smaller scale development spread across villages, open countryside, or agricultural land outside existing towns and cities, rather than developed as a nucleated settlement around a central feature.

1.5 This review deliberately excludes an assessment of the sustainability of 'compact city', infill and 'brownfield-first' spatial options. While recognising that the task of urban regeneration and shaping existing places is vital, this decision is based on the understanding that the North Essex Authorities (NEAs) are already pursuing strategies that maximise the potential of available previously used and 'brownfield' land, in line with Paragraph 117 of the revised NPPF ('NPPF2'). As such, the outstanding need is for evidence on the most sustainable way to 'top up' the diminishing supply of brownfield sites by developing parcels of greenfield land in order to meet housing delivery targets - as is the case with the proposed North Essex spatial strategy. Any strategy for delivering new settlements should therefore sit alongside policies for urban infill and consolidation (URBED, 2014, p. 5).

2 The UK's legacy of urban form and infrastructure

2.1 Urban form and infrastructural legacies accrue over long time scales, and shape the pathways available for guiding that urban form into the future. In the UK, patterns of urban growth, over the last century in particular, have produced a distinctive spatial legacy that should be broadly understood before potential future scenarios are evaluated.

2.2 In the immediate post-war era, development in the UK remained largely compact and contained, surrounded in many instances by protected Green Belts (although no such Green Belt exists in North Essex). However while earlier development tended to be clustered around rail infrastructure, by the late 1960s car ownership had begun to influence development patterns. Settlements were increasingly designed for car owners, leading to more 'star shaped' urban forms with settlements strung along arterial roads (Williams, p12). From the 1980s onwards there was a growing disconnect between urban forms, land use and infrastructure (Williams, 2014, p11), and the UK began to witness the development of 'edge city' landscapes (characterised by relatively low-density suburban retail, leisure and industrial parks anchored by road infrastructure) and more dispersed, peripheral dormitory settlements (ibid, p13). This led to a complex set of travel and cross-commuting patterns beyond the previous 'in-out' commuting patterns of the past, raising long-term sustainability challenges related to dominant travel modes (ibid, p19).

2.3 In the 1990s the rise of the 'Urban Renaissance' agenda brought a renewed focus on the reuse of brownfield sites and 'compact city' strategies. However while this agenda continues, more recently many LPAs are finding that they are unable to meet housing delivery targets through brownfield reuse alone, and have sought the most sustainable ways of using greenfield sites either on the edges of the built-up area or outside it. This has particularly been the case in the South East of England, where demand for land has been the greatest. Paragraph 72 of NPPF2 (2018) states that:

"The supply of large numbers of new homes can often be best achieved through planning for larger scale development, such as new settlements or significant extensions to existing villages and towns, provided they are well located and designed, and supported by the necessary infrastructure and facilities."

2.4 These new growth strategies must navigate a host of challenges left by the country's spatial and infrastructural legacy, including the challenge of infrastructure 'lock in' (Williams, 2014, p20), whereby the UK is 'locked in' to certain spatial patterns to due to the legacy of infrastructure investments.

2.5 The commentary below provides greater detail on the impact of these three urban form typologies along the three classical dimensions of 'sustainability' - social, environmental, and economic. This is followed by a discussion of the key issues around the deliverability of each typology.

3 Environmental Impacts

New settlements

3.1 New settlements are, necessarily, often built on greenfield land (Williams, 2014, Table 1), leading to the inevitable loss of some associated ecosystem services which may include biodiversity, landscape quality, or agricultural production. However there are also instances where brownfield land can be utilised as the basis for a new settlement, for example on redundant defence establishment sites (TCPA, 2007, p. 9).

3.2 When it comes to the relationship between urban form and climate change, the nature of transport connections is a key factor (see Harris, 2018, p.17-18). It is recognised that, when designed and developed carefully as 'holistic' neighbourhoods, new settlements can encourage highly sustainable living patterns (TCPA, 2007, p. 5). However a report by the Committee on Climate Change (CCC) notes that *"where possible, housing should be developed within existing urban areas"*, thus providing easy access to amenities and reducing the need to travel (Committee for Climate Change, 2019, p. 103). In contrast, new settlements can lead to an increase in car commuting when they increase the need to travel, for example in cases where they function as dormitory settlements (Williams, 2014, Table 1) or fail to provide easy access to amenities (Committee for Climate Change, 2019, p. 103). Trip generation is likely to reduce as settlement size increases, provided the settlement in question is reasonably self-contained and can lead to journey internalisation (TCPA, 2007, p.9).

3.3 In any case, it is critical that infrastructure is funded and provided in the early stages of the development (known as the 'infrastructure first' approach). This is in part because of evidence that, once travelling by car is established as a preferred mode of travel, it can be difficult to encourage people to change even with the provision of improved public transport infrastructure (CCC, 2019, p. 105). A case study of the new settlement of Dickens Heath in Solihull found that inadequate provision of public transportation was an unresolved issue, despite other highlighted successes (TCPA, 2007, p. 14).

3.4 Another study also suggests that standalone settlements generate a high level of 'embodied emissions' (i.e. the greenhouse gas emissions generated by the creation of goods that are being consumed), due to the need to construct entirely new infrastructure networks, which is generally more emissions-intensive than servicing development within existing settlements (Harris, 2018, p27).

3.5 However it is also highlighted that a range of sustainable energy systems (including renewable energy and CHP) can most economically be provided at the neighbourhood scale, thus favouring larger-scale new neighbourhoods (URBED, 2014, p.18).

Urban extensions

3.6 Urban extensions are also commonly developed on valued peripheral greenfield land (Williams, 2014, Table 1), leading to potentially significant impacts on the associated ecosystem services, as described for new settlements.

3.7 The Committee for Climate Change (CCC) favours the provision of new housing within existing urban areas, reducing the need to travel (Committee for Climate Change, 2019, p. 103). However, dependent on the quality of connections provided to adjacent settlements, urban extensions can also generate car use (Williams, 2014, Table 3).

3.8 Urban extensions are able to share transport infrastructure with the existing settlement from day one, however there is often *"a need to reinforce those connections with new investments, such as a tram link, railway station or underground station"* (PRP et al, 2008, p.16), depending on the capacity of and distance to existing transport infrastructure.

Dispersed development

3.9 While individual developments may 'not be problematic' in relation to environmental resources including biodiversity, in aggregate form *ad hoc* dispersal can incrementally develop valued open land and may lead to damage to biodiversity (Williams, 2014, Table 3), i.e. the effects on ecosystem services may be similar to those described for new settlements and urban extensions.

3.10 A further key drawback of dispersed development is its impact on travel demand and the availability of sustainable transport modes. The CCC report notes that *"small low density remote settlements can be prohibitively expensive to service with public transport"* (CCC, 2019, p. 105; Williams, 2014, Table 3).

4 Social Impacts

New settlements

4.1 When well designed, new settlements can provide high quality living environments with infrastructure provided on site (schools, doctor's surgeries, public transport). However it has also been highlighted that the design quality in new settlements is variable (Williams, 2014, Table 1).

4.2 Future demographic projections indicate an ageing population across the UK, and the need to provide appropriate variety of dwelling types to cater to changing needs. New settlements, if designed to be flexible to future changes, can successfully cater to the changing needs of an ageing population (Williams, 2014, Table 3).

4.3 The available evidence does not point to any clear consensus on the link between scale of delivery and the provision of affordable housing, with a recognition that "*the relationship between housing supply and affordability is neither simple or direct"* (RTPI, 2017, p. 5). New settlements, when successfully delivered, are seen as being capable of providing affordable housing, particularly for families (Williams, 2014, Table 1). This is based on the assumption that larger-scale development can bring economies of scale, making them potentially cheaper to deliver (Bramley et al, 2017, p.43) and *"enabling the delivery of significant additions to social housing stock, so long as S106 obligations can be applied to a significant level"* (ibid, p. 35). A study by the RTPI in the South West of England (where in places affordability levels are close to those of the South East) concludes that, while large-scale developments do not immediately lead to lower house prices, over the longer term the increase in supply improves affordability (Bramley et al, 2017, p.2). However there is evidence that the delivery of affordable housing may be more significantly influenced by scheme-specific factors and changing grant funding priorities, especially given the need for supporting infrastructure (Bramley et at, 2017, p.4), and suggests that large sites should only be *"part of the solution to meeting affordable housing needs"* (ibid, p. 43).

4.4 Given the need to start 'from scratch', one of the major challenges in providing new settlements is the long-term and incremental nature of community-building, its vulnerability in the early years (URBED, 2014, p.4), and the task of building up 'fine-grained social capital' that makes for a thriving community (ibid, p.100). One study suggests that "*there should be something idealistic about a Garden City, it should attract people looking for an alternative to the faceless housing estate"* (ibid, p.14). Evidence suggests that creating a strong and distinctive sense of identity (and giving a new settlement its own name) is key to success (PRP et al, 2008, p. 20; see also TCPA, 2007), which must be bolstered by sustained local leadership over long time frames (PRP et al, 2008, p.7).

4.5 The NHS highlights that the requirement to meet housebuilding targets presents the potential to facilitate healthier lifestyles and to look at how health and wellbeing can be planned and designed into new places (NHS England, 2018). If a new settlement fails to achieve an adequate degree of self-containment and provision of locally accessible services (including health care), a reliance on car-based travel can have negative implications for public health (Harris, 2018, p.33), however if a large enough local population can provide a critical mass to enable patronage for a wider range of local shops and services, this can benefit active travel and have positive public health impacts (p.35). In addition, new settlements on a significant enough scale may be better placed to provide a range of health services at an integrated health centre, enabling health staff to work in a more joined up way and 'putting health at the heart of the community', as outlined in Principle 10 laid out by the NHS *Healthy New Towns* program (NHS England, 2018).

Urban extensions

4.6 Peripheral housing developments are popular with home buyers and, when well integrated, have good access to host city amenities (Williams, 2014, Table 1). Although it has been noted that many peripheral developments lack design quality and a sense of place (Williams, 2014, Table 1).

4.7 The potential for urban extensions to deliver affordable housing is informed by many of the same factors that affect new settlements. However particular affordability challenges have been highlighted (Williams, p23).

4.8 Like new settlements, urban extensions - if designed to be flexible to future changes - can successfully cater to the changing needs of an ageing population (Williams, 2014, Table 3).

4.9 While new settlements can provoke opposition from nearby residents and on environmental grounds, extending an existing city also presents the challenge of 'winning over' existing communities, which may prove resistant. This is particularly the case where there is past experience of ill-planned development. One study suggests using a 'Social Contract' framework to address the concerns of this community and ensure that new infrastructure and facilities benefit the whole of the community (URBED, 2014, p.20).

4.10 Similarly to new settlements, the implications of urban extensions for public health depend partly on the extent to which the configuration and success of local services manage to shift modal choice away from cars (Harris, 2018, p. 33). There is no conclusive evidence on whether urban extensions as an urban form reduce or generate car travel – this is generally a product of the detail of their design and delivery. In terms of access to healthcare services, such extensions can perform well provided adequate new services are provided within (Williams, 2014, Table 3).

Dispersed development

4.11 Dispersed development can sometimes play a role in providing homes for rural workers and their families and is generally popular with residents, fulfilling lifestyle aspirations for many. Advocates argue that it responds more effectively to market demands (Williams, 2014, Table 1 and p27).

4.12 It is noted by the RTPI that dispersed developments struggle to meet the density requirements to provide frequent accessible, comprehensive and affordable public transport, and that the low levels of land use mix in peripheral areas mean that activities are generally less accessible by cycling and walking (Harris, 2018, p.12). As such this typology also struggles to produce the public health dividends from increasing physical activity, with implications for the prevalence, severity and cost of chronic lifestyle-related diseases due to a reliance on inactive travel (Harris, 2018, p. 32). This extends to implications for mental health, with studies suggesting that low-density and dispersed urban forms *"may negatively impact mental health by increasing the distance and length of commuting journeys, and by encouraging passive modes of transport"* (Harris, 2018, p.36).

4.13 It has been noted that calls for a more dispersed urban form have been based on the assumption that development on cheaper land leads to more affordable housing, and that the restriction of land supply by planning authorities has resulted in spiralling house prices (Hilber and Vermeulen, 2016, quoted in RTPI, 2017), however this view has been challenged as it "*tends to discount the benefits of densification and undervalue the additional costs that result from sprawling and dispersed urban forms, which include greater land use per housing unit, residential parking requirements, higher infrastructure and utility costs, and household transport expenses"* (Litman, 2015, quoted in Harris, 2018). It has been highlighted that, in practice, dispersed development *"has tended to provide housing at the higher end of the market, with affordability a problem"* (Williams, 2014, Table 3; see also RTPI, 2017, p.12) and, while in theory a similar scale of delivery could be provided across a number of smaller sites, an RTPI report finds that "*it is not clear that a multiplicity of smaller sites would be built-out any faster than or be subject to the same S106 obligations* " as large-scale development (Bramley et al, 2017, p.2).

4.14 Further, unlike new settlements and urban extensions, it can only achieve limited flexibility to changing needs, hindering the ability to respond to major social changes such as an ageing population (Williams, 2014, Table 3). Access to services, including health care, is a key problem for dispersed developments (Williams, 2014, Table 3) as they are less likely to provide the scale to be able to provide integrated health centres (see Principle 10 of NHS England, 2018).

5 Economic Impacts

New settlements

5.1 A question commonly asked of new settlements is whether they can support local economies and economic diversity. Evidence suggests that this depends on the scale they are able to achieve, and the viability of mixed uses that enable residents to be economically active within the settlement (Williams, 2014, Table 3).

5.2 The UK's own history of New Towns emphasises that the ability to attract employment that matched the skills of the workforce was critical in the success of some of the post-war New Towns (TCPA, 2007, p. 8).

5.3 If large/mixed enough to enable residents to be economically active within the settlement, new settlements can support local economics and economic diversity. They can also attract inward investment, provided that development is of high quality and provides adequate buildings, services and connections for investors (Williams, 2014, Table 3). One report notes that the 'clustering' that can be achieved by new settlements *"widens the economic and cultural frame for residents, increases innovation and economic growth, and assists international competitiveness"* (TCPA, 2007, p.40). Post-war New Towns such as Milton Keynes are viewed as examples of where, as a result of investment in retail infrastructure and employment alongside housing, places were produced that *"play an important role in the wider economy"* (TCPA, 2015, p. 21).

5.4 However experience from Europe suggests that standalone new settlements are generally an economic disadvantage compared to urban extensions, given that the latter benefit from a nearby urban conurbation that can share access to jobs in the early stages (PRP et al, 2008, p. 8).

Urban extensions

5.5 Urban extensions are able to support local economies and economic diversity, provided that the development is large enough or that the population is economically active within the adjacent settlement. Provided with high quality development and adequate buildings, services and connections, urban extensions can also attract inward investment (Williams, 2014, Table 3). These extensions can also benefit from the 'clustering' effect noted for new settlements.

5.6 A 2007 report by the TCPA provides an example of an urban extension contributing to economic development in Newcastle, where it was found that the edge of city location proved attractive to investors and takes advantage of the 'edge city' phenomenon that forms part of the urban form legacy in the UK (TCPA, 2007, p. 20). However this strategy relied on attracting a major company to base its international headquarters within the development (p. 22).

Dispersed development

5.7 Dispersed development can support rural economies, in some cases (Williams, 2014, Table 1). However this type of *ad hoc* development is unlikely to reach the scale required for employment creation in tandem with residential uses.

6 Deliverability

New settlements

6.1 Concerns have been raised over the scale of new infrastructure required to deliver standalone settlements, which is recognised in several studies as one of the most intractable challenges of delivering new settlements. New standalone settlements present the most acute deliverability challenges of all three options and generally require a tailored delivery mechanism that is able to fund infrastructure costs and would constitute a radical break from how infrastructure has been delivered to support housing infrastructure in development in recent years (see Bolton & Foxon, cited in Williams, 20134, p50)

6.2 A study of new settlements in Europe found that, giving contemporary commuting patterns, 'containment' or self-sufficiency is no longer viable, and that relatively few locations are likely to satisfy the basic requirements needed to 'make the numbers up' without huge investment in new transport systems (PRP et al, 2008, p. 16). One study roughly estimates the per-dwelling cost of delivering adequate infrastructure for a large-scale 'virgin new town' at £80,000, based on the delivery of 69,500 homes (URBED, 2014, p.22).

6.3 The Committee on Climate Change (CCC) report also notes that placing 'garden villages' away from urban centres makes it harder to ensure adequate bus provision and that the extra costs of providing these should be factored into the decision to develop (Committee on Climate Change, 2019, p. 105).

6.4 Experience from Europe highlights the importance of infrastructure for new settlements being funded and provided in the early stages. In several European cases, infrastructure was funded through long-term debt from public financial institutions and repaid from land sales (similarly to the UK's owns history of funding New Towns), rather than relying on a 'lottery' system of central government grants (PRP et al, 2008, p.8).

6.5 The governance backdrop for delivering large-scale housing in the UK and the nature of land markets contrast sharply with the situation we find in European countries such as the Netherlands, Germany and Sweden (PRP et al, 2008). It also presents a sharp contrast with the governance structures that delivered new standalone communities in the past within the UK. Milton Keynes, often perceived as the most successful New Town, not only benefitted from low cost land (stripped of its 'hope value'), but also a public investment of over £700 million through long-term public loans (PRP et al, 2008, p. 13). In contrast, the UK's current housing delivery model must take into account higher 'hope values' of land, and relies heavily on the private sector to provide both housing and associated infrastructure and facilities. As such, one study warns against building standalone new settlements akin to the post-war New Towns, arguing that *"building a new town exacerbates the dysfunctionality of this system"* (URBED, 2014, p10). Some actors, including the TCPA, advocate for a return to similar principles used in the wave of Garden Cities and New Towns developed in the early to mid-20th century (see TCPA, 2015).

Urban extensions

6.6 Many of the same challenges for deliverability cited for new standalone settlements also apply to urban extensions. However the infrastructural burden is lessened in the case of urban extensions, which are able to 'graft' infrastructural investments onto existing networks. One study roughly estimates the per-dwelling cost of delivering adequate infrastructure for an urban extension at £40,000, half that required for a new standalone settlement (URBED, 2014, p.22).

6.7 While being able connect to existing urban infrastructure, where spare capacity exists (Williams, 2014, Table 1; PRP et al, 2008, p.24), some new infrastructure is likely to be required. A review of European case studies found that successful urban extensions generally provided investment that reinforced existing networks, in the form of trams, railway stations or underground stations (PRP et al, 2008, p. 16).

Dispersed development

Dispersed development, which often avoids upfront infrastructure costs, often appears less expensive. However it should be highlighted that residents will nevertheless require transport and other services, and that this more dispersed form of development can prove prohibitively expensive to adequately service with public transport (Committee on Climate Change, 2019, p. 105).

7 Guiding principles for the location and scale of new settlements

7.1 While hard and fast rules certainly do not emerge from existing studies, a review of the available evidence points to a number of broad principles which might guide the location, form and scale of new settlements, and the relationship they should have to existing urban form. Several of these principles - summarised below - call for a skilful balance between distance and proximity, and between distinctive identity and integration:

- **Proximity to thriving towns and cities |** New settlements should be located close enough to growing and thriving conurbations that they can share infrastructure and access to jobs and services in the early stages, based on European examples. As a guideline this means *"a choice of jobs within half an hour's travel by good public transport"* (PRP et al, 2008, p24).
- **Integration with existing settlements |** However new development should also *"draw on the strengths of existing conurbations and add to them, rather than draw resources away from them"* – including jobs, education and services (PRP et al, 2008, p.24). This principle can create tensions with the requirement to be in 'close proximity to thriving towns and cities', and requires a careful balancing act to create a successful relationship between the two settlements. More generally, there is a need recognised in the UK for a 'far clearer logic around the connectivity of settlements and their hinterlands', backed up by a spatial strategy that may take inspiration from integrated functional city-region strategies in the Netherlands and Germany (Williams, 2014, p.50), evident in the Dutch VINEX policy that delivered new settlements between 2,000 and 10,000 dwellings between 1995 and 2005 (see Shelter, 2018, p.17).
- **Shaping new settlements and extensions around transport nodes |** There is broad consensus in the literature that new strategic development must be located in areas with high levels of public transport accessibility. In line with the principle of 'transit-oriented development' (TOD), studies suggest that successful settlements and extensions should be 'grafted' onto existing transport infrastructure, potentially making use of existing mainline railway stations or disused lines, with additional branches (carrying trams of BRT systems) looping through new neighbourhoods (URBED, 2014, p. 2). A study by the RTPI (Harris, 2018) suggests that the most sustainable patterns are concentrated in a small number of strategic locations, with any development outside of large existing settlements located along well-served bus corridors and in close proximity to rail stations and other transport interchanges. For housing, 250-300 metres is recommended for local bus services, and 500 metres for high-frequency services to key centres (Pharaoah, 2016, quoted in Harris, 2018, p.18).

8 Guiding principles for the location and scale of all large-scale development

8.1 A further set of principles emerge that apply to all large-scale development, including both new settlements and urban extensions:

8.2 **Avoiding threats to connectivity |** When planning urban extensions, it is important for environmental outcomes that new development not cut off or 'severed' from adjacent development by major roads and roundabouts (Committee for Climate Change, 2019, p. 103). Similarly, while landscape buffers and green space are encouraged as part of new large-scale development (Harris, 2018, p. 32; PRP et al, 2008, p.26), it is important these 'buffers' do not threaten the connectivity and permeability with nearby uses, with a clear preference for 'traditional' grid networks which provide numerous points of access (Hickman et al, 2010, p.81).

8.3 **Achieving sufficient scale |** Both new settlements and urban extensions must be of a sufficient scale to support economic productivity and make efficient use of infrastructure networks, as well as to increase physical activity through walking, cycling and public transport (Harris, 2018, p.32). In the case of new settlements, by providing a greater mix of employment, shops and specialised services, there is a possibility of a greater degree of 'self-containment', lessening trip lengths and reducing the need for inter-urban travel (Hickman et al, 2010, p. 78-79). However it should be noted that several studies cast doubt on the viability of complete 'containment' or self-sufficiency (see PRP et al, 2008; TCPA, 2007, p.39).

8.4 **Identifying areas of high housing demand |** New development is more likely to be successful when delivered in areas of high housing demand, and when the provision reflects the range of housing cost levels and tenures in the local area (PRP et al, 2008, p.17).

9 Non-spatial factors to consider for sustainable housing delivery

9.1 The evidence reviewed provides no definitive consensus on the sustainability credentials of urban extensions (UEs) as against new standalone settlements. However the evidence outlined above suggests that there is a growing consensus that dispersed development fails to deliver long-term sustainability goals, and should only be considered as a solution to target specific, identified needs rather than as a strategy for achieving large-scale housing growth.

9.2 Notably, much of the evidence points to factors beyond the spatial morphology and location of new development, which may have the greatest influence on the chances of success of new sustainable communities. A report that assesses existing examples of new settlements and extensions across Europe to distil lessons for the UK found, notably, that "*some of the biggest differences and reasons for success lay in those areas which transcend urban design and planning, and stray into local political structures and methods of finance, procurement and management."* (PRP et al, 2008, p. 10).

9.3 The following list of such factors is not exhaustive, but includes:

- **Densities |** There is a consensus that sustainable new communities should be relatively compact, with densities that support good quality infrastructure and hence offer a better quality of life than existing suburbs (PRP et al, 2008, p8). Specified density requirements are seen as an important way to shape new settlements - an RTPI report recommends average levels of 50-100 dwellings per hectare (dph), rising to 100-200 dph around important public transport nodes (Harris, 2018, p.18). However other studies suggest a much lower range of densities, from 30-45 dph at the low end, to 65 dph in more central neighbourhoods (URBED, 2014, p.16). The ability of higher-density urban forms to reduce emissions is believed to outweigh the emissions associated with hard adaptation measures such as engineered flood defences and air conditioning (Harris, 2018, p. 28).
- **Mixed uses |** By specifying mixed uses within a masterplan, complementary uses can be co-located and travel distances reduced (Hickman et al, 2010, p.81). Compact, medium density, mixed use and public-transport friendly settlements can also encourage continued physical activity, economic participation and social interaction for all, and in particular for an ageing population (Harris, 2018, p. 43).
- **The 'investor' model |** The current focus in the UK on the market-led delivery mechanism causes challenges for delivering large-scale, sustainable development. A model is called for whereby returns are sought over a longer term than housebuilders tend to expect (PRP et al, 2008, p7; TCPA, 2015, p.22), on the understanding that communities take time to develop and grow (TCPA, 2007, p.10). In the UK, our current predominantly market-led mechanisms for delivering infrastructure alongside development (largely through weak tools such as S106 and CIL) are seen to be *"delaying, and creating, problems for future generations and are likely to need radical reform"* (Williams, 2014, p. 50; see also NIC, p.65). Some, including the TCPA, have suggested that land value capture (LVC) mechanisms - which aim to capture the uplift in land value that results from development in order to fund growth-enabling infrastructure– is the best way to achieve new towns or urban extensions (TCPA, 2007, p.46), but they also acknowledge the complexities of finding the right way to recoup the share of profits from the land (ibid, p.10). The National Infrastructure Commission also acknowledge that the mechanism can only success in areas where the value of development land is high compared to agricultural or industrial land (NIC, 2017, p.65).
- **A collaborative urban governance model |** Appropriate urban governance models and collaborative ways of working must be identified (see PRP et al, 2008) which stray from 'fixed' administrative boundaries for governance (Williams, 2014, p37). This might involve financing mechanisms for the maintenance of green spaces and other assets that go beyond

traditional models in order to allow for more sustainable financing – this might include strategies inspired by the Milton Keys Parks Trust model, whereby an independent charity is given an endowment and are given responsibility for upkeep (among other innovative financing models – see

- **Resourcing of local government |** An adequately resourced local government sector that can provide sustained local leadership and fulfil tasks in initial stages such as land assembly and master planning (PRP et al, 2010, p. 13; see also Williams, 2014, p38).

10 Conclusions

10.1 The evidence from existing studies does not point to any neat conclusions over the ideal 'urban form' , but rather to a portfolio of different spatial options for different contexts, with all studies noting that each option may produce both negative and positive sustainability outcomes. This is in line with current Planning Practice Guidance (PPG), which advises that:

> *"plan makers will need to assess a range of different site sizes from small-scale sites to opportunities for large-scale development such as village and town extensions and new settlements where appropriate".*[1]

10.2 However it should be noted that existing evidence suggests that the 'dispersed development' growth model present significant sustainability challenges in the longer term. The commentary above highlights a range of concerns regarding this typology, including: difficulties in providing affordable housing in mixed settlements; the inactive and unsustainable travel patterns it encourages; and the cost of servicing such settlements with transport and other infrastructure when they do not reach a sufficient 'critical mass'.

10.3 Regardless of the location selected for development, from the evidence reviewed, it is possible to distil a set of broad principles that can be integrated into either a new settlement or an urban extension, which give the settlement the greatest chance of success as a sustainable community. These touch on both physical form and the delivery models that underlie them. They are:

- high densities that can support services and infrastructure;
- mixed uses;
- an investor model that is able to provide upfront funding for infrastructure;
- cross-boundary and cross-sectoral collaboration;
- and the early setup and adequate resourcing of local government, enabling sustained local leadership.

10.4 Notably, the studies reviewed suggest that the chances of success in building a 'sustainable community' rely on a number of factors that go beyond the choice of location and physical form, to include non-spatial factors such as appropriate governance structures, financing mechanisms and stewardship arrangements. Where such structures and delivery mechanisms are missing, this causes particularly acute challenges for the delivery of freestanding new settlements, given the burden of infrastructure provision they pose.

10.5 As such, the success of new settlements depends on factors beyond their spatial form. Table 1 at the end of this document reproduces a table from Williams (2014) that summarises the 'conditions for achieving successful new places to 2065', broken down by: new peripheral developments, new settlements, and dispersed development. Much of this evidence has been drawn on in the report, however the full table is provided here in full for reference. Ultimately the Table reiterates the findings of this review and points to conclusions that, while the 'dispersed development' model raises challenges for creating successful places, both urban extensions and standalone new settlements can become 'successful places' socially, economically and environmentally, provided they are thoughtfully designed, appropriately located, and well served (at an early stage) with adequate infrastructure.

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[1] Planning Practice Guidance, Paragraph 010. Revision date: 06 03 2014.

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Table 1: Conditions for achieving successful new places to 2065 (reproduced from Williams, 2014)

Characteristics of successful urban forms in the UK	**New peripheral developments**	**New settlements**	**Dispersed development**
Successful urban forms are ones that:	*Can this be achieved?*	*Can this be achieved?*	*Can this be achieved?*
Environmental characteristics			
Make sustainable use of the UK's land resource (accommodating demographic change without loss of valued land)	Yes, if sited in appropriate locations: e.g. not on land of high ecologically/landscape value.	Yes, if sited in appropriate locations i.e. well connected enough, not on land of high ecological/landscape value	Not usually, although individual developments might not be problematic, in aggregate, continued *ad hoc* dispersal would develop valued open land.
Make sustainable use of the UK's environmental resources (including protecting and enhancing biodiversity)	Yes, if planned sensitively. But there may be some inevitable loss if developing on greenfield sites.	Yes, if delivered using sustainable planning and design principles, including best practices (e.g. in Sustainability Impact Assessment, responsible sourcing, and integrated infrastructure – such as waste to energy). But there may be some inevitable loss if developing on greenfield sites.	Partly, small scale changes may not be problematic, but in aggregate are inefficient and may damage biodiversity.
Are physically adapted for the UK's future climate	Yes, if future climate is considered from the outset in design, planning and construction.	Yes, if adaptation is considered during design and construction.	Partly, if individual developments consider future climate from the outset in design, planning and construction. But harder to plan/manage collective/community scale solutions.
Do not contribute to future climate change (i.e. reduce carbon emissions, exceeding or matching international targets)	Yes, if they are zero/low carbon developments, and do not generate transport emissions. Travel emissions can be minimised by providing a mix of uses in the development and good connections to existing settlement.	Yes, if low/zero carbon design is applied from the outset, and if new physical and virtual connections to existing settlements/destinations are low carbon, and/or reduce travel demand.	Partly, if autonomous (micro) energy generation solutions are used. But likely to result in significant transport emissions (car travel).
Improve (or do not worsen) air quality	Yes, if development is designed as zero emission from the outset, and good connections are made to adjacent settlement. But are likely to inevitably generate some emissions from increased car use.	Yes, if development is designed as zero emission from the outset and good connections are made to existing destinations. But are likely to inevitably generate some emissions from increased car use.	Unlikely, due to few alternatives to car travel for dispersed development, so continued emissions likely (unless major change to electric vehicles).
Facilitate efficient water management (systems and behaviours)	Yes, if new, efficient water infrastructure is provided (e.g. sustainable urban drainage systems) and connections are	Yes, if new, efficient water infrastructure is provided (e.g. sustainable urban drainage	Partly, can facilitate localised water harvesting and recycling (at the level of a dwelling or group of dwellings). But is not efficient for

Characteristics of successful urban forms in the UK	New peripheral developments	New settlements	Dispersed development
	made to supply infrastructure in adjacent settlement (to maximise use of any 'spare' capacity). And if new development promotes water efficient behaviours (e.g. By using water meters, providing water butts etc.). But there may not be enough water for populations in some areas (given regional disparities and climate change).	systems) and connections are made to supply infrastructure in adjacent settlement maximising use of any 'spare' capacity. And if new development promotes water efficient behaviours (e.g. by using water meters, providing water butts etc.). But there may not be enough water for populations in some areas (given regional disparities and climate change).	mains water provision, and waste water processing
Facilitate efficient energy management (systems and behaviours)	Yes, if new efficient energy supply systems are provided (e.g. renewable) and/or the new development links to and makes use of spare capacity from adjacent supply sources. But new population may breach existing supply.	Yes, if new efficient energy supply systems are provided (e.g. renewable) at the outset.	Partly, can facilitate localised energy generation (at the level of a dwelling or group of dwellings). But is not efficient for provision from the grid/pipelines.
Facilitate efficient transport management (systems and behaviours)	Yes, if new efficient transport infrastructure is provided to adjacent settlement and wider destinations. And if peripheral development is large enough to provide mix of uses and facilitate walking/cycling.	Yes, if new efficient transport infrastructure is provided. And if the new settlement is large enough to provide mix of uses and facilitate walking/cycling.	No, dispersed development is difficult to service with public transport, and low carbon travel (walking and cycling) levels tend to be lower.
Facilitate efficient waste (solid and water) management (systems and behaviours)	Yes, if new efficient waste infrastructure is provided, and/or linked to any spare capacity in adjacent settlement	Yes, if waste management systems are well planned and infrastructure provided.	Partly, can facilitate localised waste management, e.g. there may be space for compositing. But, inefficient for general waste collection, recycling services etc.
Facilitate the efficient integration of different infrastructure systems	Partly. Where new infrastructure is required there may be the opportunity to introduce new integrated systems (e.g. energy to waste). But where infrastructure is connecting to existing systems, there may be lock-in.	Yes, if best practice in integrated systems (e.g. energy to waste, smart transport) are planned and provided.	Partly, if it facilitates small scale integrated infrastructure systems (e.g. within autonomous housing). But is inefficient and costly for mainstream systems (e.g. transport, energy, waste).
Social characteristics			
Adapt to future changes (social, economic and environmental) in a socially equitable way	Partly, if designed/developed to be flexible to future changes.	Partly, if designed/developed to be flexible to future changes.	Partly, provides some small scale flexibility. But not responsive to major social changes, e.g. does not provide enough affordable housing.
Are desirable to the population	Yes, if high quality extensions, with a mix of house sizes and types, are provided at affordable costs. And if the adjacent	Yes, if the development is high quality, and provides a mix of house sizes and types at	Partly, very desirable, particularly to more affluent householders seeking larger homes/more space, for second home owners,

Characteristics of successful urban forms in the UK	New peripheral developments	New settlements	Dispersed development
	settlement is desirable.	affordable costs.	and to rural residents, seeking to remain in their home towns/villages. Not desirable for those unable to afford it.
Provide a range of housing types and tenures to meet needs and be affordable	Yes, if designed to accommodate a variety of household types.	Yes, if designed to accommodate a variety of household types.	No, dispersed development has tended to provide housing at the higher end of the market, with affordability a problem.
Are accessible for all	Yes, if good connections to the adjacent settlement and to wider destinations are provided.	Yes, if good connections within the development and to wider destinations are provided.	No, accessibility is a key problem for dispersed developments (in terms of distance, range of nearby destinations, and car dependency).
Provide access to health/ education/ culture/ leisure services for all	Partly, if residents can access existing provision in adjacent settlement (and there is capacity). Or, if adequate new services are provided within the extension.	Partly, if the new settlement provides adequate services, or if they are provided in other settlements nearby.	No, accessibility to services is a key problem for dispersed developments (in terms of distance, provision of nearby services, and car dependency).
Are healthy	Yes, if planned and designed according to healthy urban planning principles. Can provide significant opportunities for good peripheral design where people can thrive. But, if they are not well connected, can become car dominated dormitories characterised by inactive travel.	Yes, if planned and designed according to healthy urban planning principles. Can provide significant opportunities for good design. But, if they are not well connected, can become car-dominated dormitories characterised by inactive travel.	Partly, if they support an active, rural life. But can become car-dominated, with inhabitants relying on inactive travel.
Economic Characteristics			
Do not cause land/property price shocks/instability	Partly, this depends on how much land is released and how this affects local/regional supply and demand.	Partly, this depends on how much land is released and how this affects local/regional supply and demand.	Partly, incremental process so does not usually have dramatic impact. But demand for this type of development by more affluent, and by those buying second homes has changed the rural housing market.
Enable efficiencies in infrastructure costs	Yes, if extensions are relatively high density then new infrastructure can connect to existing infrastructure in the adjacent city (where there is capacity), and be provided cost effectively. And, new infrastructure (such as combined heat and power systems) can be provided to serve the new population.	Yes, if well planned, and if new infrastructure systems are integrated. If densities and mix of use are well planned then low per capita costs.	No, it is costly to service dispersed developments. Per capita costs are high because of spatial distribution.
Enable efficiencies in public service (e.g. schools) costs	Yes, if extensions are relatively high density then the development can use services already provided in the adjacent development (i.e. where there is	Yes, if populations are large enough then services can be provided at efficient per capita costs. However, there are	No, public services are costly per capita in dispersed developments, because of spatial distribution (e.g. waste collection, social care).

Characteristics of successful urban forms in the UK	New peripheral developments	New settlements	Dispersed development
	capacity), or new services can be provided (e.g. schools) cost effectively to the new community.	different population thresholds for different services (e.g. primary schools, hospitals), so some costs may be borne by adjacent towns/cities.	
Enable efficiencies in transport costs (for suppliers and residents)	Yes, if connections to adjacent settlement (transport interchanges and hubs) are optimised.	Partly, if developments are large enough, and well planned, then per capita costs can be low for supplying transport services, and residents will have options to walk/cycle. However, there will be infrastructure costs connecting to other hubs.	No, transport infrastructure is costly to provide to dispersed developments.
Support local economies and economic diversity	Yes, if the development is large/mixed enough and its population is economically active within the adjacent settlement, or in the new extension.	Yes, if the development is large/mixed enough to enable residents to be economically active within the settlement.	Partly, may support rural economies through diversification/modernisation.
Attract inward investment	Yes, if a high quality development, and if it provides buildings/ services/ connections desirable to investors	Yes, if a high quality development, and if provides buildings/ services/ connections desirable to investors.	No, investment in dispersed locations tends to be small scale and piecemeal.
Facilitate innovation and creativity	Yes, if attracts creative/skilled population, and supports capacity in adjacent or nearby creative clusters.	Yes, if attracts creative/skilled population, and supports capacity in adjacent or nearby creative clusters.	Partly, there can be small scale innovation, but most innovation/ creativity is associated with clusters/ hubs of skilled people/businesses.
Facilitate efficient ICT provision	Yes, if links to provision in adjacent development, and is part of a connected city region.	Yes, if it is part of a connected city region.	No. dispersed developments are difficult and costly to service with ICT.