

Garden City Standards for the 21st Century

Practical Guides for Creating Successful New Communities

## guide 12

# modern methods of construction





**tcpa**

Practical Guides for Creating Successful New Communities

**Guide 12: Modern Methods of Construction**

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**The Lady Margaret  
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This Practical Guide has been prepared by Cova Cervilla Bordiu and Katy Lock of the TCPA.

Cover photograph of Etopia Corby, courtesy of Project Etopia.

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# The TCPA Practical Guides

Across the UK there is a shortage of housing, and it is increasingly understood that we need to plan and build new large-scale developments, in addition to renewing existing towns and villages. At the same time, many people worry that any new places built will be no more than soulless, unattractive dormitory suburbs. How can we prevent such outcomes? How can we ensure that new large-scale developments become socially and economically successful places – places that will improve over time, and in which people will want to live for generations to come? The answer lies in the Garden City development model – a proven way of funding, creating and maintaining successful high-quality places. A true Garden City is a place created following the Garden City Principles, set out in the box below.



National planning policy guidance on a range of issues has been greatly reduced, so practical advice about how to create successful new places is more important than ever. The TCPA's Practical Guides – on location and consent; finance and delivery; design and masterplanning; planning for energy and climate change; homes for all; planning for arts and culture; planning for green and prosperous places; creating health-promoting environments; long-term stewardship; 'edible' Garden Cities; people, planning and power; and modern methods of construction – are not detailed handbooks but instead set out the scope of opportunities for ambitious councils who want to create high-quality, large-scale new developments, whether or not they are able to follow all the Garden City Principles. The Guides highlight key points for consideration and offer signposts to sources of further detailed information. They are 'living' documents that will be periodically updated to reflect key policy changes. Although they are focused on policy in England, the principles and key recommendations can be applied across the UK. The Practical Guides will help anyone attempting to create great places, for everyone, whether or not they describe what they are trying to achieve as a 'Garden City'.

## The Garden City Principles

A Garden City is a holistically planned new settlement that enhances the natural environment and offers high-quality affordable housing and locally accessible work in beautiful, healthy and sociable communities. The Garden City Principles are an indivisible and interlocking framework for delivery, and include:

- Land value capture for the benefit of the community.
- Strong vision, leadership and community engagement.
- Community ownership of land and long-term stewardship of assets.
- Mixed-tenure homes and housing types that are genuinely affordable.
- A wide range of local jobs in the Garden City within easy commuting distance of homes.
- Beautifully and imaginatively designed homes with gardens, combining the best of town and country to create healthy communities, and including opportunities to grow food.
- Development that enhances the natural environment, providing a comprehensive green infrastructure network and net biodiversity gains, and that uses zero-carbon and energy-positive technology to ensure climate resilience.
- Strong cultural, recreational and shopping facilities in walkable, vibrant, sociable neighbourhoods.
- Integrated and accessible transport systems, with walking, cycling and public transport designed to be the most attractive forms of local transport.

The TCPA has produced an extensive set of policy and practical resources on Garden Cities, which can be found at <http://www.tcpa.org.uk/pages/garden-cities.html>

# Summary

Creating new communities that provide a range of genuinely affordable homes and local jobs in healthy and climate-resilient new places involves innovative approaches to design and place-making. Innovation is also essential if we are to meet the scale of demand for higher-quality new homes across the country, and the UK construction sector has been exploring how to make this a reality.

In considering how to meet its ambitious target of enabling the delivery of 300,000 homes per year by the mid-2020s and net-zero greenhouse gas emissions by 2050 (a commitment re-iterated in the Conservative Party's 2019 general election manifesto), the government is investing in research on and delivery of non-traditional construction techniques, broadly known as 'modern methods of construction' (MMC). The term 'MMC' essentially refers to a wide range of construction techniques, meaning, in its broadest sense, anything that differs significantly from 'traditional' building methods.

MMC can provide a wide range of benefits, from faster construction to the highest environmental standards at lower costs than with traditional building techniques. However, the MMC approach does not come without challenges. The pace of change in the industry has been such that the evidence base on performance is still evolving, and there remains some scepticism over MMC among some planners, lenders, developers and residents, based on both myth and reality. The benefits and challenges may be summarised as:

**Benefits:**

- Speed of delivery.
- Amenity during construction.
- Build cost.
- Build quality.
- Environmental performance.

**Challenges:**

- Evidence of durability.
- Procurement.
- Integrating planning and MMC.
- Funding and mortgage availability.
- Place-making and design concerns.

MMC are not 'silver bullet' solutions to the nation's housing crisis, nor to the quality of places being delivered. However, there are a number of clear opportunities for councils, developers and communities to include MMC as part of a portfolio of housing offers and approaches in new communities. This Practical Guide outlines some principles for making the most of this opportunity and overcoming some of the challenges set out above, based on five key themes:

- Principle 1: Anticipate and lead.
- Principle 2: Setting standards in Local Plan policy.
- Principle 3: Design and masterplanning.
- Principle 4: Leadership and collaboration.
- Principle 5: Monitoring.

Whatever construction approach is taken, putting in place the right structures for good place-making is essential. There exists a wealth of research and technical guidance on MMC at all scales. Key documents for further reading are set out at the end of this Practical Guide.



# 1

## Introduction



BRE

Mixing traditional design with modern construction techniques – the Prince’s Natural House, built at BRE’s Innovation Park in 2011, is constructed from natural materials, including aerated clay block, lime-based renders and plasters, and insulation made from compressed wood fibre and sheep’s wool

Addressing our current housing crisis requires not just the building of the required number of homes, but the provision of genuinely affordable and high-quality homes of all tenures in healthy and climate-resilient communities. The TCPA has outlined in other publications the opportunities to do so through the use of the Garden City Principles,<sup>1</sup> but one aspect that is harder to address through this framework is the practical availability of the raw materials and skilled labour necessary for delivery.

The government's ambitious target of enabling the building of 300,000 homes per year by the mid-2020s and net-zero greenhouse gas emissions by 2050,<sup>2</sup> alongside mounting evidence of labour and materials shortages, and reports of poor build quality in many new homes, has led to a resurgence of interest in new construction techniques which are some way from traditional bricks-and-mortar approaches.<sup>3,4</sup>

1 A wide range of guidance from the TCPA is available at <https://www.tcpa.org.uk/guidance-for-delivering-new-garden-cities>

2 This commitment was reiterated in the 2019 Conservative Party general election manifesto, *Get Brexit Done: Unleash Britain's Potential*

3 The Farmer Review outlined how the construction workforce is likely to decrease by 20%-25% over the next ten years – see *The Farmer Review of the UK Construction Labour Model*. Construction Leadership Council, Oct. 2016. <http://www.cast-consultancy.com/wp-content/uploads/2016/10/Farmer-Review-1.pdf>

4 A report from the CITB (Construction Industry Training Board) – *The Impact of Modern Methods of Construction on Skills Requirements for Housing*. CITB, Apr. 2019. <https://www.citb.co.uk/global/research/citb-mmc-report-mar-2019.pdf> – found that meeting government targets for 300,000 homes per year would require an additional 195,000 workers by 2025, a need which could be reduced to 158,000 if MMC techniques were used

For many people, the idea of constructing homes off-site conjures up images of the prefabricated homes of the post-Second World War era, and along with it fears about poor build quality. But knowledge and technology have advanced significantly since then, and building homes in factories is one solution that forms part of what government and the building industry have termed ‘modern methods of construction’ (MMC). There is currently a revolution in research and development in MMC which combines different techniques, materials and approaches with the ability to deliver high environmental standards through new technologies. A key attraction for many is the speed of delivery, with some off-site approaches enabling build completions within several weeks, and in some cases 12 months faster than traditional bricks-and-mortar approaches.<sup>5</sup>

MMC are not ‘silver-bullet’ solutions to meeting housing needs at speed, and the experience of MMC approaches is constantly evolving, alongside the knowledge base among practitioners. While much of the industry is celebrating the opportunities offered by MMC, concerns have also been raised over issues such as the potential impacts on place-making, alongside nervousness among insurers and others about the emerging techniques.

The Garden City pioneers placed great emphasis on local materials and craftsmanship in the built environment, alongside innovation in enabling a better way of living. Embracing this spirit of innovation in building new Garden Cities today requires an awareness of emerging techniques, approaches and materials to enable the Garden City Principles to be realised. Self- and custom-build homes in new Garden Cities may involve disparate approaches such as cob-built homes and shipping container live-work hubs. Councils should consider MMC opportunities as part of this mix. Whatever approach is taken, the fundamental message is about good place-making – putting the right frameworks in place to ensure that, whatever building technique is used, the best outcomes for people are achieved.

This Practical Guide provides an introduction to the emerging opportunities and challenges for those involved in delivering world-class new communities for everyone.

## 1.1

### What are 'modern methods of construction'?

‘MMC’ is an umbrella term for a wide range of construction techniques which, in their broadest sense, involve anything that differs significantly from ‘traditional’ building methods. The term incorporates everything from innovations in on-site building techniques (such as new ways to lay concrete brickwork) to homes that are built from components or whole units constructed off-site in a factory. In its research on MMC, the NHBC Foundation identified five typologies within the MMC umbrella (see Box 1 on the next page). A more technical framework of seven categories was identified by the MMC Joint Industry Working Group in 2019.<sup>6</sup>

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5 *MMC for Affordable Housing Developers: A Housing Forum Guide to Overcoming Challenges and Barriers.* Housing Forum, Sept. 2019. <http://www.housingforum.org.uk/publications/housing-forum-reports->

6 The seven categories identified are:

- Pre-manufacturing – three-dimensional primary structural systems.
- Pre-manufacturing – two-dimensional primary structural systems.
- Pre-manufacturing components – non-systemised primary structure.
- Additive manufacturing – structural and non-structural.
- Pre-manufacturing – non-structural assemblies and sub-assemblies.
- Traditional building product led site labour reduction/productivity improvements.
- Site process led labour reduction/productivity/assurance improvements.

Taken from *Modern Methods of Construction: Introducing the MMC Definition Framework.* Modern Methods of Construction Joint Industry Working Group. Ministry of Housing, Communities and Local Government, Mar. 2019. <https://www.gov.uk/government/publications/modern-methods-of-construction-working-group-developing-a-definition-framework>

## Box 1 Defining MMC

'MMC' is a wide term that includes a range of off-site manufacturing and on-site techniques that provide alternatives to traditional housebuilding methods. The term embraces a variety of approaches and its definition has varied over the years, with numerous associations. MMC include the following types:<sup>i</sup>

- **Volumetric construction** – three-dimensional units that are fully fitted out off-site.
- **Pods** – used in conjunction with other construction methods. Examples are bathroom or kitchen pods.
- **Panelised systems** – panels with timber or light steel framing, structural insulated panels (SIPs), or cross-laminated timber.
- **Sub-assemblies and components** – larger components incorporated into new homes. They include roof and floor cassettes, prefabricated chimneys, porches and dormers, and I-beams.
- **Site-based MMC** – innovative methods of construction used on-site. They include thin-joint blockwork and insulated formwork.

<sup>i</sup> *Modern Methods of Construction: Views from the Industry*. NHBC Foundation, Jun. 2016.  
<https://www.nhbcfoundation.org/publication/modern-methods-of-construction-views-from-the-industry>

Technical guidance listed in Section 6 incorporates advice on all these techniques. The pointers in this Practical Guide apply to all these technologies, but in terms of place-making are mainly relevant to those that are created off-site.

## 1.2 The purpose of this Practical Guide

The TCPA's *Homes for All, Design and Masterplanning* and *Energy and Climate Change* Practical Guides outline the place-making opportunities offered by housing provision in new Garden Cities.<sup>7</sup> Recognising the current interest from government and practitioners in MMC, this Practical Guide provides councils, developers, housebuilders and other interested stakeholders with a flavour of the opportunities and challenges in using MMC when building new communities. It does not seek to replicate the wealth of existing detailed and technical guidance on MMC opportunities and challenges but provides an introduction and overview. It includes:

- an introduction to MMC;
- a review of the policy context and funding opportunities;
- an outline of the principles for success when considering MMC in new community schemes; and
- signposts to detailed and technical guidance on all aspects of MMC.

<sup>7</sup> See: *Guide 3: Design and Masterplanning*. Garden City Standards for the 21st Century: Practical Guide for Creating Successful New Communities. TCPA, Dec. 2017; *Guide 4: Planning for Energy and Climate Change*. Garden City Standards for the 21st Century: Practical Guide for Creating Successful New Communities. TCPA, Feb. 2016; *Guide 5: Homes for All*. Garden City Standards for the 21st Century: Practical Guide for Creating Successful New Communities. TCPA, Mar. 2016. All available at <https://www.tcpa.org.uk/guidance-for-delivering-new-garden-cities>



# 2 Policy and funding context

## 2.1 Policy context

Support for MMC cited in the Conservative Party general election manifesto in 2019 and the appointment of Mark Farmer as a 'Champion for MMC' in November 2019 provide the most recent indications of government commitment to MMC. While there is no direct mention of MMC in the National Planning Policy Framework, Planning Practice Guidance mentions off-site construction as a potential opportunity to deliver good design. The opportunities offered by MMC are also outlined in a number of policy documents, as set out below.

### **Garden Communities prospectus**

The 2018 *Garden Communities* prospectus<sup>8</sup> offers advice to local areas that want to create new 'garden communities', as well as criteria that should be met if proposals are to be considered for government assistance. In the 'Delivery time scales and accelerated delivery' section the prospectus states that proposals that 'offer a strong prospect of early delivery and a significant acceleration of housing delivery' will be prioritised. It says that housebuilders 'should consider the scope for innovative ways to deliver new homes, such as off-site construction, custom build and self-build, as well as providing opportunities for a diverse range of house builders' – and that proposals demonstrating that building will be achieved while maintaining quality will be prioritised.

### **Housing White Paper**

The 2017 Housing White Paper set out the government's intention to open the housing market to those who 'embrace innovative and efficient methods',<sup>9</sup> and to support housing associations who 'promote more modular and factory-built homes'. It states that the housebuilding industry is less productive than the wider economy and that it needs to modernise and use more efficient ways of building. In reference to MMC it states:

*'They are high quality, reliable, more productive and can be highly energy efficient. [...] They can require fewer people on site, helping to mitigate the skills shortage. Some firms are increasing their use of these methods, but we need to go further.'*

The government is committed to stimulating growth through a variety of funding opportunities and through the Ministry of Housing, Communities and Local Government (MHCLG) Joint Industry Working Group for MMC.

### **MHCLG Joint Industry Working Group for MMC**

After the publication of the Housing White Paper, a working group was set up to support the use of MMC in residential development. The group developed a framework to regularise and refine the term 'modern methods of construction' by defining the different categories of

8 *Garden Communities*. Prospectus. Ministry of Housing, Communities and Local Government, Aug. 2018. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/805688/Garden\\_Communities\\_Prospectus.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/805688/Garden_Communities_Prospectus.pdf)

9 *Fixing Our Broken Housing Market*. Cm 9352. Housing White Paper. Ministry of Housing, Communities and Local Government, Feb. 2017. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/590463/Fixing\\_our\\_broken\\_housing\\_market\\_-\\_accessible\\_version.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/590463/Fixing_our_broken_housing_market_-_accessible_version.pdf)

MMC.<sup>10</sup> These categories support a more structured approach, enabling the creation of datasets which help stakeholders to build a common understanding of the different forms of MMC. This approach builds confidence in MMC based on a better evidence base.

### **Government response to the Housing, Communities and Local Government Select Committee report on MMC**

In September 2019, the Housing, Communities and Local Government Select Committee published a report on MMC,<sup>11</sup> presenting a wide range of evidence. The report encourages the use of MMC and supports the idea of creating a pipeline of opportunities for the sector and investors. The government's response to this report<sup>12</sup> began by outlining its initiatives to support and encourage MMC since the White Paper was published. These included exploring measures to improve access to finance and land, risk management, expanding the evidence base, the use of MMC for affordable housing, skills provision, and supporting the pipeline of MMC, including a 'presumption in favour of MMC' by 2019 across all construction programmes in five key government departments. In response to the Housing, Communities and Local Government Select Committee's 21 recommendations, the government was supportive of several of the recommendations – for example in relation to the use of business information modelling to improve the quality of MMC outputs on site, and also in relation to speeding up the delivery of the MMC Joint Industry Working Group's outputs to encourage more people to adopt MMC. Several recommendations were also rejected – for example in relation to requiring the use of MMC by developers who access public funds such as 'Help to Buy', reducing the use of imported MMC components, and reporting on what MHCLG spent on supporting MMC developments. The government outlined in its response how its activities and those of Homes England are seeking to address some of the issues raised in the recommendations.

### **Homes England Strategic Plan 2018/19-2022/23**

The Homes England Strategic Plan 2018/19-2022/23<sup>13</sup> sets out the organisation's ambition to increase the use of MMC as a core way to improve the housing market. One of the performance indicators set out in the plan is the 'Share of supported completions using Modern Methods of Construction', and one of Homes England's longer-term priorities is to 'seek to secure commitments from local authorities to progress sites at pace and encourage the use of MMC'. Homes England also notes that 'we must embrace change to improve productivity in the industry', and that one of its 2018-2020 priorities is to 'encourage developers to use MMC and increase the capacity of the off-site manufacturing industry'.

### **Northern construction corridor**

In November 2019, MHCLG announced that it would invest £30 million in order to support a belt of production facilities and factories for MMC stretching across Lancashire and

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10 *Modern Methods of Construction: Introducing the MMC Definition Framework*. Modern Methods of Construction Joint Industry Working Group. Ministry of Housing, Communities and Local Government, Mar. 2019. <https://www.gov.uk/government/publications/modern-methods-of-construction-working-group-developing-a-definition-framework>

11 *Modern Methods of Construction*. HC 1831. Fifteenth Report of Session 2017-19. Housing, Communities and Local Government Committee. House of Commons, Jul. 2019. <https://publications.parliament.uk/pa/cm201719/cmselect/cmcomloc/1831/1831.pdf>

12 *Government Response to the Housing, Communities and Local Government Select Committee Report on Modern Methods of Construction*. CP 168. Ministry of Housing, Communities and Local Government, Sept. 2019. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/832176/SC\\_168\\_-\\_modern\\_methods\\_of\\_construction.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/832176/SC_168_-_modern_methods_of_construction.pdf)

13 *Strategic Plan 2018/19-2022/23*. Homes England, Oct. 2018. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/752686/Homes\\_England\\_Strategic\\_Plan\\_AW\\_REV\\_150dpi\\_REV.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/752686/Homes_England_Strategic_Plan_AW_REV_150dpi_REV.pdf)

Yorkshire.<sup>14</sup> MHCLG suggested that when the industry matures it could be worth £40 billion a year and provide up to 80,000 jobs, with a new hub in the North of England.

## 2.2 Funding opportunities

Access to investment is often the greatest challenge for MMC, owing to the uncertainty arising from an unfamiliar approach, with effects on costs, site issues, the supply chain, and labour requirements. However, research has shown that some off-site products and processes have already become embedded in the conventional housebuilder supply chain, albeit as an augmentation to the traditional approach rather than a replacement for it.<sup>15</sup> Moreover, there are a variety of funding opportunities that, if used appropriately, can support local authorities and developers in delivering MMC for homes in new communities.

In 2017, the Department for Communities and Local Government published a paper on the then new **Accelerated Construction** programme,<sup>16</sup> which aims to help deliver up to 15,000 homes through £1.7 billion of investment. Regarding off-site construction, it stated that ‘the programme is designed to support our market diversification objectives by supporting non-major builders and help tackle the construction skills gap, including through greater use of Modern Methods of Construction (MMC)’. Work has recently begun on the first pilot sites, and over the next 12 months work will start on 1,544 MMC homes across seven sites.

The **Home Building Fund** is a £4.5 billion government finance scheme aimed at increasing the number of homes built in England. The funding is in the form of loans between £250,000 and £250 million, with ‘smaller loans considered for innovative housing solutions and serviced plots for custom builders’.<sup>17</sup> The Home Building Fund also reflects wider government initiatives and prioritises projects that are part of other government schemes, one of which is the ‘Garden Communities’ programme. To apply for the funding, organisations need to contact Homes England, and if the proposal meets the eligibility criteria Homes England’s investments team assists with making an application. As of September 2019, £236 million from the fund had been allocated to schemes that incorporate MMC.<sup>18</sup>

The Department for Education has set up a £3 billion **Off-site School Framework** to ‘modernise the industry by increasing the adoption of MMC’. The programme will deliver 30 schools a year over the next four years.<sup>19</sup>

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14 ‘Housing Minister unveils £30m boost for ‘Construction Corridor’’. Press Release. Ministry of Housing, Communities and Local Government, 3 Nov. 2019. <https://www.gov.uk/government/news/housing-minister-unveils-30m-boost-for-construction-corridor>

15 *Modern Methods of Construction: A Forward-Thinking Solution to the Housing Crisis?* Royal Institution of Chartered Surveyors, Sept. 2018. <https://www.rics.org/globalassets/rics-website/media/news/news—opinion/modern-methods-of-construction-paper-rics.pdf>

16 *Accelerated Construction: Local Authorities*. Department for Communities and Local Government, Jan. 2017. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/581520/Accelerated\\_construction\\_Eol.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/581520/Accelerated_construction_Eol.pdf)

17 *An Introduction to the Home Building Fund*. Homes England, Oct. 2016. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/744217/An\\_introduction\\_to\\_the\\_home\\_building\\_fund\\_revised\\_September2018.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/744217/An_introduction_to_the_home_building_fund_revised_September2018.pdf)

18 *Government Response to the Housing, Communities and Local Government Select Committee Report on Modern Methods of Construction*. CP 168. Ministry of Housing, Communities and Local Government, Sept. 2019. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/832176/SC\\_168\\_-\\_modern\\_methods\\_of\\_construction.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/832176/SC_168_-_modern_methods_of_construction.pdf)

19 ‘DfE announces winners for £3bn offsite schools framework’. *pbctoday (Planning, BIM & Construction Today)*, 16 Jan. 2020. <https://www.pbctoday.co.uk/news/modularconstruction-news/offsite-schools-framework-dfe/70185/>

# 3 Opportunities and challenges

MMC do not offer ‘silver bullet’ solutions to the nation’s housing crisis, nor are they guarantees of the quality of places delivered. However, there are a number of clear opportunities on offer to councils, developers and communities by including MMC as part of a portfolio of housing delivery in new communities. This Section outlines the key opportunities for councils in using MMC, alongside an outline of some of the current concerns and reservations about MMC approaches.

## 3.1 Why consider MMC? Opportunities for councils

Potential advantages from using MMC fall under the following areas:

- speed of delivery;
- amenity during construction;
- build cost;
- build quality; and
- environmental performance.

### Speed of delivery

Pressure to meet housebuilding targets and reduce development costs are such that for housebuilders and government at all levels the prospect of building homes at speed is undoubtedly one of the main attractions of MMC.<sup>20</sup> Many traditional techniques, such as bricks and mortar, can be hostage to the weather, holding up completion times. For off-site factory-made homes weather is significantly less of a factor, and for some MMC techniques completion times can be reduced by 30%-70% compared with traditional build<sup>21</sup> – sometimes reducing project construction periods by up to 12 months.<sup>22</sup> The efficiency and adaptability of MMC can also allow for flexibility of use on irregular plots and can improve the viability of smaller and infill sites.<sup>23</sup> For councils, increasing the speed of delivery can help in meeting housing supply targets and provides the opportunity for earlier occupation by residents.

### Amenity during construction

Constructing components of homes off-site can reduce delivery vehicle movement and noise disruption – and hence potential impacts on amenity for nearby residents – during the building phase. Research carried out by New London Architecture notes that quicker delivery also causes less disruption for those in the community already residing on the site, with fewer detrimental effects from noise and poor air quality and less traffic congestion in the surrounding area.<sup>24</sup>

20 The potential speed of construction is demonstrated in time-lapse in ‘Timelapse of a Project Etopia home construction’. YouTube video. Project Etopia TV, Apr. 2019. <https://www.youtube.com/watch?v=LTeZAw6zdjI>

21 *Factory-Made Housing: A Solution for London?* New London Architecture, Oct. 2018. <https://www.newlondonarchitecture.org/whats-on/publications/all-nla-publications/factory-made-housing-a-solution-for-london>

22 *MMC for Affordable Housing Developers: A Housing Forum Guide to Overcoming Challenges and Barriers*. Housing Forum, Sept. 2019. <https://mailchi.mp/50f27d434aab/mmc-affordable-housing-developers-guide-2019>

23 See *The Farmer Review of the UK Construction Labour Model*. Construction Leadership Council, Oct. 2016. <http://www.cast-consultancy.com/wp-content/uploads/2016/10/Farmer-Review-1.pdf>

24 *Factory-Made Housing: A Solution for London?* New London Architecture, Oct. 2018. <https://www.newlondonarchitecture.org/whats-on/publications/all-nla-publications/factory-made-housing-a-solution-for-london>



## Box 2

### Berkeley factory, Ebbsfleet – local manufacture and upgrading local skills



The Berkeley factory at Ebbsfleet

Following the success of off-site modular processes used for the 'Urban Houses' at Kidbrooke Village in South East London, the Berkeley Group is developing a modular housing manufacturing facility at Ebbsfleet Garden City, a new community of 15,000 homes and a part of the government's 'Garden Communities' programme. The facility is due to be operational in 2020, producing high-quality, high-performing housing components in volume.

Development of the factory is the result of a commercial site search rather than an invitation from Ebbsfleet Development Corporation (EDC), the body delivering the new community. In Berkeley's application to EDC for permission to build on the site, an emphasis was put on upskilling the local workforce. The company recognised the requirement for continued training in a range of new skills, as well as the need to adapt and upskill the existing workforce, and its aim is to recruit the necessary workforce within the local area.

EDC supports the principle of MMC in Ebbsfleet, where a school is currently being built using MMC techniques. This too was a decision of the contractor rather than EDC but nevertheless serves as a useful test of delivery speed.

## Build cost

The scalability, and evidence of 20%-40% reductions in the whole-life costs of homes (i.e. all the costs incurred from inception to construction, occupation and operation, and eventual demolition and disposal), makes MMC an attractive proposition for providers, and

### Box 3

#### BoKlok and Worthing Council – MMC and genuine affordability?

Affordable housing developer BoKlok, a Swedish company owned by IKEA and Skanska, has entered into an agreement with Worthing Council in West Sussex to build 162 low-cost prefabricated homes. The first apartments will be available from 2021.

Worthing Council will be given 30% of the homes at cost value, to be used as social housing, in return for the use of land. The balance will be sold under BoKlok's 'left to live' model, wherein prices are set such that they leave families with money to live. To calculate this affordability figure, BoKlok takes the average salary of those in full-time employment and calculates a 25-year mortgage that would be manageable after monthly living costs and tax. The homes will be allocated to owners using a ballot system.

The low price points are achieved by pre-manufacture off-site using more sustainable materials such as timber, low-carbon materials, and recycled offcuts. All houses come with an IKEA kitchen. BoKlok is in ongoing conversations regarding possible developments in other parts of the country.

For further information, see <https://www.adur-worthing.gov.uk/news/pr20-014.html>

particularly for providers of sub-market ('affordable') and socially rented homes.<sup>25</sup> Some MMC housebuilders have also reported that MMC can lead to improved profitability, with 44% of housebuilders and 27% of housing associations surveyed by the NHBC Foundation pointing to benefits such as reduced preliminary costs, improved cash flow, and faster sales revenues.<sup>26</sup> There is evidence that upfront costs can be higher with MMC (see Section 3.2), particularly for high-specification cladding or finishing techniques, but longer-term savings can be beneficial. This is a particular advantage when councils are involved in direct delivery on larger sites.

### Build quality

There has been a renewed political focus on the quality of new homes. The combination of an increasing number of reports of poorly built homes and an increased focus on building safety and accountability following the Grenfell tragedy has shone a light on the urgent need for better quality in new homes.<sup>27</sup> Building homes in a factory can be done with better controls and testing to ensure that build quality is as expected and defects are minimised, which in turn can reduce the need for maintenance across a home's lifetime.<sup>28</sup> The flexibility of factory construction also offers the potential for increased quality assurance across different build types built in the same factory.<sup>29</sup> While MMC offer quality control benefits, it does not necessarily follow that build quality *will* be better than with traditional methods.

25 *Modern Methods of Construction: Views from the Industry*. NHBC Foundation, Jun. 2016.

<https://www.nhbcfoundation.org/publication/modern-methods-of-construction-views-from-the-industry/>

26 *Ibid.*

27 *Planning 2020 'One Year On' – 21st Century Slums?* Raynsford Review of Planning in England. TCPA, Jan. 2020.

<https://www.tcpa.org.uk/the-raynsford-review-of-planning-one-year-on>

28 *Modern Methods of Construction*. HC 1831. Fifteenth Report of Session 2017-19. Housing, Communities and Local Government Committee. House of Commons, Jul. 2019.

<https://publications.parliament.uk/pa/cm201719/cmselect/cmcomloc/1831/1831.pdf>

29 *How Modern Methods of Construction Can Deliver 'More' through the Planning System*. Arup, Jun. 2019.

<http://thinkhouse.org.uk/2019/arup.pdf>



MMC homes at Etopia Corby, built to energy-positive standards

## Environmental performance

The built environment is responsible for around 40% of the UK's total carbon footprint,<sup>30</sup> and construction is responsible for half of the total waste produced in the UK.<sup>31</sup> But the creation of new and renewed communities is an essential element in creating climate-resilient places.<sup>32</sup> One of the key benefits of using MMC in new communities is the potential to build to higher environmental standards – on carbon dioxide emissions, energy efficiency, and waste – compared with standard traditional volume-built homes. Factories can be optimised to minimise material waste to below 1% of the total (by comparison waste levels in traditional construction typically range between 18% and 22%<sup>33</sup>), and in some cases the materials themselves are more sustainable than traditional materials (see Box 4 on the next page, for example).

MMC also provide opportunities for enhanced energy performance (see the case study on Etopia Corby in Section 5.1): the energy typically required to heat MMC homes is typically 20%-30% less than for traditionally built new homes.<sup>34</sup>

30 *Bringing Embodied Carbon Upfront: Coordinated Action for the Building and Construction Sector to Tackle Embodied Carbon*. World Green Building Council, Sept. 2019

[https://www.worldgbc.org/sites/default/files/WorldGBC\\_Bringing\\_Embodied\\_Carbon\\_Upfront.pdf](https://www.worldgbc.org/sites/default/files/WorldGBC_Bringing_Embodied_Carbon_Upfront.pdf)

31 *Modern Methods of Construction*. HC 1831. Fifteenth Report of Session 2017-19. Housing, Communities and Local Government Committee. House of Commons, Jul. 2019.

<https://publications.parliament.uk/pa/cm201719/cmselect/cmcomloc/1831/1831.pdf>

32 *Rising to the Climate Crisis: A Guide for Local Authorities on Planning for Climate Change*. TCPA and RTPI. TCPA, Dec. 2018. <https://www.tcpa.org.uk/Handlers/Download.ashx?IDMF=fd66dbe5-2b88-4acf-b927-256a82db9abe>

33 *Modern Methods of Construction: Views from the Industry*. NHBC Foundation, Jun. 2016.

<https://www.nhbcfoundation.org/publication/modern-methods-of-construction-views-from-the-industry/>

34 *Modern Methods of Construction*. HC 1831. Fifteenth Report of Session 2017-19. Housing, Communities and Local Government Committee. House of Commons, Jul. 2019.

<https://publications.parliament.uk/pa/cm201719/cmselect/cmcomloc/1831/1831.pdf>

#### Box 4

##### Timber frame – a sustainable approach

Timber frames are widely used within MMC as they deliver a high-performance building solution that directly contributes to achieving high Code for Sustainable Homes levels. If the wood is sustainably sourced, timber construction has the lowest carbon dioxide cost of any commercial building method. Compared with steel and concrete, production (and transportation) is less detrimental to the environment. Timber also offers good thermal insulation, thus reducing energy consumption for heating.

For further information, see *The Timber Industry: Growing Our Low-Carbon Economy*. The Timber Accord, Oct. 2014. <https://woodforgood.com/assets/Downloads/Growing%20Our%20Low-Carbon%20Economy.pdf>

## 3.2 The challenges of using MMC

Despite the broad range of benefits outlined above, the use of MMC can also present challenges. The fast-moving evolution of MMC, together with historical associations with ‘prefab’ homes, give rise to misconceptions among planners, lenders, developers, and residents, alongside the practical challenges of using evolving technologies. Research on MMC has identified the challenges of using MMC under the following themes:

- evidence of durability;
- procurement;
- integrating planning and MMC;
- funding and mortgage availability; and
- place-making and design concerns.

### Evidence of durability

One of the key challenges of rapidly evolving technologies is to monitor their long-term impacts. It is of course difficult to fully understand how new build approaches will fare in 50 years’ time, but many providers are working hard to provide data. While there is evidence of cost savings as outlined above, there remains a lack of quantified evidence to compare the improved quality benefits of MMC with traditional building methods in absolute terms.<sup>35</sup> This poses a problem for providers as they have to work harder at planning application stage to provide supporting data. Some stakeholders have said that there is a lack of data on MMC’s performance on reparability, maintenance and modification – specifically regarding costs, but also, in the face of stakeholder apprehension about fire and flood risk, extending to safety.<sup>36</sup> While such concerns can be addressed as data is increasingly built up, in the short term they may linger, impinging on the speed of approvals and hence delivery speed.

### Procurement

The upfront costs of many MMC approaches, concerns about comparing products, and worries about the ability to form long-term partnerships with providers are some of the

35 *The Farmer Review of the UK Construction Labour Model*. Construction Leadership Council, Oct. 2016. <http://www.cast-consultancy.com/wp-content/uploads/2016/10/Farmer-Review-1.pdf>

36 *Written Evidence Submitted by the Association of British Insurers*. MMC 029. Evidence submitted to the Housing, Communities and Local Government Committee Inquiry on Modern Methods of Construction, Jan. 2019. <http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/housing-communities-and-local-government-committee/modern-methods-of-construction/written/95724.pdf>



## Box 5

### MMC – not such a modern approach after all?

Some MMC approaches are, to varying extents, already used in the housebuilding industry, reflecting the fact that MMC are in themselves not so novel. The results of a survey of large and medium-sized housebuilders and housing associations published by the National House Building Council (NHBC) in 2016<sup>i</sup> found that 98% of those surveyed (together accounting for more than 45,000 new homes or 30% of NHBC new home registrations in 2015) had used or considered using a form of MMC in the previous three years; and that sub-assemblies and components (the most widely adopted element of MMC) were used by two-thirds of home-builders in at least one home during the survey year. The second most-common element of MMC, panelised systems, was used by 42% of respondents during 2015 for at least one home.

i *Modern Methods of Construction: Views from the Industry*. NHBC Foundation, Jun. 2016.  
<https://www.nhbcfoundation.org/publication/modern-methods-of-construction-views-from-the-industry/>

reasons why the issue of compliance with public procurement requirements is raised by many stakeholders. The Housing Forum has cited such compliance concerns as one of several ‘myths’ around MMC but has outlined how the use of MMC is compliant with the Public Contracts Regulations 2015.<sup>37</sup> However, this remains a concern for some practitioners, which in turn can impact on the speed of procurement.

### Integrating planning and MMC

Uncertainty in the market, caused in some part by the lack of data outlined above, has resulted in some cases in a long administrative process to assess technical reports before approving the use of MMC in building new homes. This can be time consuming and costly for both developers and local authorities, undermining the potential speed and cost of delivery benefits. Research carried out by Arup<sup>38</sup> indicates that planning delays and planning risks are consistently cited as a key challenge faced by developers. However, it is expected that as the market matures the system will reach a point at which MMC performance is verified and fewer reports will be needed. Arup’s research has suggested ways of speeding up planning approval for MMC developments. The challenge is to ensure that speed does not result in a compromise in the quality of outcomes. One of the benefits of MMC is the inherent opportunities to customise homes that many of the resulting structures offer to occupiers, including the number and size of bedrooms within a building footprint. This can create challenges for planners, who need to be sure about the proposed housing mix, occupier numbers, car-parking calculations, etc.

### Funding and mortgage availability

As a result of the challenges around the lack of data and resulting uncertainty, the finance sector has approached MMC with caution, and so developers have faced difficulties in securing warranties, insurance, and mortgages. Furthermore, the finance model for MMC developments requires upfront capital to set up factories and assembly lines before any housing development. The House of Commons Housing, Communities and Local Government Committee heard evidence that modular companies expect at least 30% of the

37 *MMC for Affordable Housing Developers: A Housing Forum Guide to Overcoming Challenges and Barriers*. Housing Forum, Sept. 2019. <https://mailchi.mp/50f27d434aab/mmc-affordable-housing-developers-guide-2019>

38 *How Modern Methods of Construction Can Deliver ‘More’ through the Planning System*. Arup, Jun. 2019. <http://thinkhouse.org.uk/2019/arup.pdf>

## Box 6

### The Buildoffsite Property Assurance Scheme (BOPAS)

The Buildoffsite Property Assurance Scheme (BOPAS) has been developed jointly by Buildoffsite, the Royal Institution of Chartered Surveyors (RICS), Lloyd's Register, and BLP Insurance (Building LifePlans Ltd), in consultation with the Council of Mortgage Lenders (CML) and the Building Societies Association (BSA), with the aim of de-risking MMC for lenders and insurers. It is a 'risk based evaluation which demonstrates to funders, lenders, valuers and purchasers that homes built from non-traditional methods and materials will stand the test of time for at least 60 years'. It is based on an accreditation process that reassures lenders and funders that new MMC approaches have been thoroughly tested and approved by a credible body. The scheme also provides technical information on the various types of MMC, so enabling better understanding among key stakeholders.

For further information, see <https://www.bopas.org/>

overall contract value upfront.<sup>39</sup> The need for high levels of upfront capital alongside the limited support from funders and the insurance industry has also given rise to concerns over scheme viability. However, supporters of MMC approaches highlight their lifetime and maintenance cost benefits.

In response to market concern over funding and mortgage availability for MMC the MHCLG has set up a joint working group with lenders, valuers and the industry, which aims to ensure that mortgages and building insurance are more readily available through better-aligned assessment and accreditation. At the time of writing, a Memorandum of Understanding is being finalised between major warranty providers. Schemes such as BOPAS (see Box 6) have been established to seek to de-risk the process in the meantime.

### Place-making and design concerns

Research led by the Royal Institute of British Architects (RIBA)<sup>40</sup> found that 31% of people would not consider buying a home built in the last ten years, or would only consider it as a last resort – and of these, 46% said these new homes lack style. Design and appearance is clearly an important factor for those buying a new home. Although, like any construction type, MMC can produce a variety of design outcomes, both good and bad (see Box 7) (and already has), perceptions that MMC, and in particular modular homes, deliver only rigid and monotonous outcomes have led to nervousness among some decision-makers and criticism from some architects.<sup>41</sup> As more schemes are built out to higher standards this 'fear of the new' may naturally decrease. However, the attractions of MMC to those developers who may wish to build cheaply, at speed and to low quality can lead to poor outcomes where design requirements are not put in place. It can also be more difficult for MMC homes to accommodate features common across more traditional house types, such as bay windows and porches.

39 *Modern Methods of Construction*. HC 1831. Fifteenth Report of Session 2017-19. Housing, Communities and Local Government Committee. House of Commons, Jul. 2019.

<https://publications.parliament.uk/pa/cm201719/cmselect/cmcomloc/1831/1831.pdf>

40 *The Case for Space: The Size of England's New Homes*. Royal Institution of British Architects, Sept. 2011.

<http://www.brand-newhomes.co.uk/RIBA-Case-for-space-2011.pdf>

41 See *Modern Methods of Construction*. HC 1831. Fifteenth Report of Session 2017-19. Housing, Communities and Local Government Committee. House of Commons, Jul. 2019.

<https://publications.parliament.uk/pa/cm201719/cmselect/cmcomloc/1831/1831.pdf>; and J Gardiner: 'Architects criticise government's faith in modular future'. *Building Design*, 7 Nov. 2019.

<https://www.bdonline.co.uk/news/architects-criticise-governments-faith-in-modular-future/5102568.article>

## Box 7

### Modular ugliness, modular beauty

The January 2020 report from the Building Better, Building Beautiful Commission,<sup>i</sup> established to advise the government on how to promote and increase the use of high-quality design for new-build homes and neighbourhoods, noted that ‘Modular building can be, and sometimes has been, misused to create bland, clumsy and placeless buildings. There is modular ugliness as well as modular beauty.’ The report suggests that design codes and the use of digital technology could improve modular building processes by providing certainty and a more efficient system, as well as improving place-making outcomes: ‘However, employed as a way of following a thoughtful design code at a reduced cost and with some variety, modular building need not be different from the practice followed in Edinburgh New Town and Notting Hill Gate, or the ex-warehouses of downtown Manhattan.’

i *Living with Beauty: Promoting Health, Well-being and Sustainable Growth*. Building Better, Building Beautiful Commission, Jan. 2020.  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/861832/Living\\_with\\_beauty\\_BBBBC\\_report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/861832/Living_with_beauty_BBBBC_report.pdf)

A key finding of the research underpinning this Practical Guide is that, while a design-led approach can help to improve the visual appearance of buildings, what matters most is the framework within which the buildings are developed. Getting the right alignment of environmental standards, cost and design will involve embracing new housing types, and the right framework and standards will help to ensure that this results in high-quality places.

# 4 Principles for success

The development of MMC technologies and approaches is moving fast, and government interest and investment in the industry continues to gather momentum. There is, however, a wealth of detailed guidance for councils and providers on using MMC in development at all scales (see Section 6).

For those planning for or delivering new communities, MMC can be useful in creating a range of housing and building types, and as an important means of delivering zero-carbon and energy-positive development. The holistic and long-term nature of a new community project also provides specific opportunities to maximise the benefits of MMC and put in place mechanisms to help overcome some of the challenges set out earlier in this Practical Guide.

This Section outlines some of the ways that councils can prepare for the potential use of MMC in new communities and, where it is used, attempt to maximise the benefits. The principles for success set out here fall under the following themes:

- Principle 1: Anticipate and lead.
- Principle 2: Setting standards in Local Plan policy.
- Principle 3: Design and masterplanning.
- Principle 4: Leadership and collaboration.
- Principle 5: Monitoring.

## 4.1 Principle 1: Anticipate and lead

The extent of government and industry interest in MMC is such that opportunities for using MMC are likely to increase. The benefits of speed and high environmental standards are likely to continue to make MMC an attractive part of the portfolio of options for housing provision on large sites. Councils can take a long-term approach on larger sites and consider from an early stage the opportunities offered. Early consideration allows for early dialogue with designers, providers and peers on the benefits and opportunities and on how to overcome potential setbacks. Where MMC is considered an option, a degree of education and awareness-raising among officers, elected members and local people is likely to be required, as it will involve embracing change.

### **Recommendations for councils:**

- ***Educate and raise awareness among officers, elected members and local people about MMC opportunities and challenges.***
- ***Talk to developers and understand the opportunities for partnership working or direct delivery.***
- ***Consider using e-planning tools to explore options for MMC.***

## 4.2 Principle 2: Setting standards in Local Plan policy

MMC homes come as a 'kit of parts' and cannot easily be adapted on site. Setting out policy in the Local Plan offers a way of guiding design and place-making at an early stage. Core design policies or site-specific development plan documents for new communities can set



## **Box 8**

### **An MMC pattern book?**

One of the approaches that the industry is exploring is the use of a pattern book approach to MMC, embedded within a design code, with the aim of establishing parameters for style and space standards and indicating the scale of development and site layout. Using a pre-design specification could help to speed up decisions, streamline the rest of the process, and reduce risk – a suggestion included, alongside other guidance on how to deliver MMC through the planning system, in Arup's *How Modern Methods of Construction Can Deliver 'More' through the Planning System*.<sup>i</sup>

i *How Modern Methods of Construction Can Deliver 'More' through the Planning System*. Arup, Jun. 2019. <http://thinkhouse.org.uk/2019/arup.pdf>

clear parameters for MMC on site, helping to maintain high standards, providing a benchmark for design and finish and for layout, and providing clarity for providers considering the approach. This in turn could help to overcome potential delays in the planning process at development management stage. It is important that councillors retain the right to get the desired outcome but understand early on where compromise/adjustment is and is not possible.

#### **Recommendations for councils:**

- ***Consider MMC in public engagement discussions on the Local Plan.***
- ***Consider MMC when setting design standards in Local Plan policy. The use of design codes, pattern books or other approaches could be considered. Enable flexibility and innovation, but do not compromise on design and place-making.***
- ***Consider setting specific policies on MMC, detailing broad parameters on use or design in site-specific policies or development plan documents.***
- ***Do not compromise good place-making for the sake of speed of delivery.***
- ***Provide clarity on the extent to which homes will be customisable (for example in terms of bedroom numbers).***

## **4.3 Principle 3: Design and masterplanning**

Good design principles should apply to any form of construction. Maximising the benefits of MMC involves thinking about their use at the earliest stage – and, for new communities, considering the benefits as part of the masterplanning approach.

One of the challenges that MMC providers have noted arises where MMC have been used on a site planned for traditional construction methods. Although the flexibility of some MMC means the approach can, in theory be adapted for use on any site, to ensure the best place-making benefits certain sites in a new community might be specifically identified for MMC, where shape or location might prove beneficial for certain construction types. It is easier to revert to traditional methods on a site intended for MMC than vice versa. MMC homes are also more efficiently deployed on denser developments. Early discussions about fit with areas that are more conventionally suburban in form can help to enable a more efficient process.

A broad range of MMC approaches and methods should be considered, to ensure the right solution for the site. There may also be opportunities for different types of MMC on different parts of the site. In developments such as Derwenthorpe in York, councils and providers have

## Box 9

### Prism – designing for manufacturing and assembly

There are several initiatives using technology to inform the design process, such as Prism, a Greater London Authority sponsored open source app which ‘accelerates the design process for precision manufactured housing (PMH) for London. It is free and easy to use and combines the Mayor of London’s spatial planning rules with precision manufacturer expertise to help you to quickly determine viable PMH options for your development.’ Approaches such as this aim to integrate MMC and design processes.

For further information, see <https://www.prism-app.io/index.html>

trials different types of MMC build as the site has evolved. The benefits for affordable housing provision are clear, but MMC should be one element in delivering a mix of tenures and housing types. New communities should include a variety of housing options and tenure and should be tenure-blind in their design. Where MMC have been identified as desirable on a large-scale site, there may be opportunities for on-site MMC component production facilities, such as those at Ebbsfleet (see Box 2). Early discussions about the potential of such an approach in terms of local employment should be undertaken by the local authority.

#### Recommendations for councils:

- *Consider whether MMC might be used on specific sites or parts of a site.*
- *Determine how the proposed designs fit with standards or codes outlined in policy.*
- *Expect variety, character and a tenure-blind approach in all housing.*
- *Consider opportunities for the provision of on-site facilities or experimental sites.*
- *Consider setting requirements for learning and apprenticeships.*

## 4.4

### Principle 4: Leadership and collaboration

Although local authorities’ role is crucial for the delivery of MMC, they also need to work alongside manufacturers and designers to drive and maintain high-quality design and building, collaborating across disciplines such as design, construction, manufacturing, and engineering. The Farmer Review<sup>42</sup> found that the construction industry is particularly uncollaborative – which could in itself be a reason for uncertainty in the market. Stakeholders need to put real effort into engaging with the market. There is a need for all parts of the industry to work together to address some of the specific challenges in MMC, and also to support a more collaborative and innovative approach to the housing market in general.<sup>43</sup> There is a clear opportunity to consider direct delivery and production on site in new communities.

#### Recommendations for councils:

- *Ensure that all working is cross-disciplinary.*
- *Embed MMC discussions in public engagement and stewardship conversations.*
- *Consider opportunities for direct delivery (for example through local authority led housing companies).*

42 *The Farmer Review of the UK Construction Labour Model*. Construction Leadership Council, Oct. 2016. <http://www.cast-consultancy.com/wp-content/uploads/2016/10/Farmer-Review-1.pdf>

43 *Laying the foundations for MMC: Expanding the Role of Modern Methods of Construction. One Potential Solution to the UK Housing Crisis*. Building Societies Association, Nov. 2016. <https://www.bsa.org.uk/BSA/files/20/20cee386-9dc6-4e0e-9ae9-504e3bbe4171.pdf>

## Box 10

### Gateshead Innovation Village – local partnerships and monitoring



Newly completed MMC home awaiting residents at Gateshead Innovation Village

The Gateshead Innovation Village housing project being developed by the Home Group is a 'live research project' to build a new community using a mix of traditional and modular homes, smart technologies and energy efficiency measures. The new village of 35 modular homes uses five different house types and six traditional bricks-and-mortar homes. Working with multiple specialist partners, including Homes England, Gateshead Council, BRE (the Building Research Establishment) and Northumbria University, the project tests how modular construction compares with traditional housing construction methods, collecting data on the performance of MMC-built homes to identify the best-performing methods. The data collected could be used to help supply chains to mature and give confidence to developers that they will be able to source materials and components for homes.

For further information, see <https://www.homegroup.org.uk/Corporate/Development-Partners/Gateshead-Innovation-Village>

## 4.5 Principle 5: Monitoring

The long-term nature of new community building offers opportunities for monitoring, which should be carried out across the site as a whole as well as on individual schemes. The evidence gathered could help to inform future development phases and contribute to the evidence base needed to avoid unnecessary delays within the planning process. Monitoring public attitudes can be useful here.

### Recommendations for councils:

- **Monitor across sites and individual schemes.**
- **Monitor public attitudes and measure environmental performance.**
- **Consider building monitoring requirements into planning policies and development management decisions.**

# 5 MMC in new communities

## 5.1 Etopia Corby



In 2015 Electric Corby Community Interest Company (CIC), created with support from Corby Corby Borough Council, led the formation of a consortium of like-minded private sector partners seeking to deliver 47 new net energy-positive homes on Priors Hall Park, an urban extension to Corby of 4,320 homes (one of the UK's largest housing developments) and 12.6 acres of employment space.<sup>44</sup>

The original consortium was established as a second stage in the CIC's ambition to enable delivery of homes which had zero energy bills. The consortium sought to deliver energy-positive buildings – i.e. homes and commercial buildings that not only achieve a net-zero energy bill but have the potential to be net exporters of energy, either to the community or the grid. It sought to demonstrate how the 'performance gap' that exists across the traditional volume housing market – the gap between 'as designed' and 'as built' energy consumption – could be eliminated. Planning permission was secured for the 47-home project in December 2016, and the CIC sought an MMC provider for the project, which would be delivered in line with the design code for the wider Priors Hall Park development. However, securing commercial funding for a non-traditional approach in the construction industry proved challenging, delaying the start of delivery until autumn 2018, when

<sup>44</sup> See Urban & Civic's 'Priors Hall' website, at <https://www.urbandandcivic.com/portfolio/strategic-sites/priors-hall/>



developer Project Etopia was brought on board to take the scheme through the delivery stage.

The project is now known as 'Etopia Corby' and is currently one of the UK's highest-performing developments in terms of energy efficiency (its EPC ratings are up to 105/100 – the highest rating, 'A', is achieved for buildings which have a rating of 92-100/100). The development uses a combination of various energy, construction and intelligent technologies, including off-site manufactured panels and a unique energy management system, to achieve standards which are up to double Passive House standards while being cost-effective to the developer. Project Etopia estimates that these systems could reduce the average home energy bill of £1,450 per annum to zero. Its use of MMC enabled a fast build rate, with the ground floor of the first four homes in the development taking just 38 hours to construct.

Construction on the site is now well advanced, and the first homes are now occupied. As well as being recognised by the Department for Business, Energy and Industrial Strategy through selection as a case study for the Building for 2050 initiative,<sup>45</sup> the performance of Etopia Corby homes will be extensively monitored, with data collection ongoing over the next two to three years.

For further information, see <https://www.etopiacorby.co.uk/>

## 5.2 Graven Hill, Bicester



Cherwell District Council

Graven Hill is the largest self- and custom-build site in the UK, and is being developed as part of Cherwell District Council's Bicester Garden Town project. The site will offer up to 1,900 homes over the next ten years. The development offers a flexible alternative to homebuilding using MMC approaches, such as flat-pack and modular homes, and is driven by the Graven

45 See the Building for 2050 website, at <https://www.buildingfor2050.co.uk/>



Hill Village Development Company, owned and established by Cherwell District Council. The self-build approach enables buyers to design homes to fit their needs, based on a series of pre-approved standards. The plots benefit from a pre-approved outline planning permission in the form of a Local Development Order. Each plot comes with a specific 'plot passport' that sets out key parameters for the final building. A 'plot shop' on the high street sells plots of land and provides a showroom for custom finishes and materials. Once planning applications have been submitted and registered, planning permission for building can be achieved in as little as 28 days.

## 5.3 Northstowe, Cambridgeshire



Urban Splash

The Northstowe new community is located on the former RAF Oakington site and surrounding land in Cambridgeshire. Once completed it will provide 10,000 homes, with the capacity to deliver 11,000 jobs to the local community and the Greater Cambridge region. It is also the location for one of Homes England's eight MMC 'pilot sites', on which the agency has agreed to take a potentially lesser return on land value in exchange for more ambitious MMC outcomes.

Urban Splash has partnered with Homes England to deliver 406 homes using factory-engineered modules in the new Inholm neighbourhood of Northstowe. Urban Splash was selected in 2019 and, subject to reserved matters approval, the scheme will start on site in summer 2020. This partnership aims to create something different, with place-making at its heart while delivering at speed using MMC.

Concern for successful place-making has led to the adoption of a design narrative with a historical influence – inspired by the archaeology of the location, with the development set

on higher ground defined, in an echo of traditional settlements, by defensive perimeter edges and boundaries, but connecting to the wider context. The aim is to build a 'contemporary fenland village' within Northstowe.

All the dwellings in the development are of modular construction but are being built in a range of types and styles to create a diverse neighbourhood. Early engagement with planners at South Cambridgeshire District Council was essential – involving explanation of the intended use of MMC on the site and an open discussion to ensure a shared understanding of the limitations of MMC, with the quality and track record of the developer outlined early on. The quality of the scheme was key, featuring high standards of urban design, Building for Life 12 principles used as a guide, a wide variety of housing styles and types, and development set within a high-quality public realm and open space framework.

House types and streetscapes were designed to give rooflines that link coherently, cohesion between the different house types, and elevations with a mix of the distinctive and the locally familiar. Spaces around homes are designed to have a purpose and function, with appropriate management of bin storage and car parking. As a demonstrator site it will be constantly assessed to address the data gap on MMC.

Homes England's commitment to MMC on the site has already been demonstrated through the creation of a new office constructed off-site.<sup>46</sup>

## 5.4 Port Loop, Birmingham



The Canal and River Trust and Birmingham City Council have worked in collaboration to secure outline planning consent at Icknield Port Loop, a 43 acre (17 hectare) regeneration site to the west of Birmingham city centre.

46 'Largest modular home site in the country takes shape as Homes England opens Northstowe office'. Press Release. Homes England, 23 Sept. 2019. <https://www.gov.uk/government/news/largest-modular-home-site-in-the-country-takes-shape-as-homes-england-opens-northstowe-office>

The proposed scheme includes a mixed-use development that includes up to 1,150 new homes plus retail, employment and leisure uses, non-residential institutions, hotels, and community facilities.

The Trust was keen to ensure that the development was walkable and cycle friendly, to ensure a healthy living environment. Daily access to the towpath has been retained, and water sports facilities are to be integrated with the scheme. The Trust was also keen to ensure a mix of design styles and tenures on the site – a key attraction of using MMC alongside traditional build and re-use of existing buildings. Work in partnership with Homes England, Urban Splash and Places for People has provided a range of modular, factory-built and traditionally built homes on the site. Phase 1 of the scheme included 40 modular homes, with another 28 due in the summer of 2020. Fifty modular apartments are due to be added by early 2021. Some MMC elements were also included in the traditional build aspects of the scheme.

For further information on Port Loop, see <https://www.urbansplash.co.uk/regeneration/projects/port-loop>

For further information on waterside development, see <https://canalrivertrust.org.uk/>

# 6 Sources of further information

## **TCPA publications and resources on Garden Cities, new communities and long-term stewardship**

### ■ ***Garden City Standards for the 21st Century: Practical Guides for Creating Successful New Communities***

The TCPA has produced a suite of guidance outlining practical steps for all those interested in making 21st-century Garden Cities a reality. Guidance provides detail and case studies on a wide range of key issues, including planning, investment, land assembly, delivery, and long-term stewardship:

*Guide 1: Locating and Consenting New Garden Cities* (2017)

*Guide 2: Finance and Delivery* (2017)

*Guide 3: Design and Masterplanning* (2017)

*Guide 4: Planning for Energy and Climate Change* (2016)

*Guide 5: Homes for All* (2016)

*Guide 6: I'd Love to Live There! Planning for Culture and the Arts* (2016)

*Guide 7: Planning for Green and Prosperous Places* (2017, revised 2018)

*Guide 8: Creating Health-Promoting Environments* (2017)

*Guide 9: Long-Term Stewardship* (2017)

*Guide 10: 'Edible' Garden Cities* (2019)

*Guide 11: People, Planning and Power* (2019)

*Guide 12: Modern Methods of Construction* (2020)

*Guide 13: Sustainable Transport* (2020)

All available at <https://www.tcpa.org.uk/guidance-for-delivering-new-garden-cities>

### ■ ***The Garden City Opportunity: A Guide for Councils***. Jan. 2020.

<https://www.tcpa.org.uk/the-gc-opportunity-guide-for-councils>

### ■ ***The Art of Building a Garden City – Garden City Standards for the 21st Century***. Jul. 2014.

<https://www.tcpa.org.uk/Handlers/Download.ashx?IDMF=15aa0250-9200-491a-9f56-b81475df64ad>

### ■ ***New Towns and Garden Cities – Lessons for Tomorrow. Stage 2: Lessons for Delivering a New Generation of Garden Cities***. Sept. 2015.

<https://www.tcpa.org.uk/Handlers/Download.ashx?IDMF=62a09e12-6a24-4de3-973f-f4062e561e0a>

### ■ **TCPA New Communities Group**

The New Communities Group (NCG) is a group of ambitious local authorities and development corporations planning and delivering exemplary large-scale new communities. The NCG helps in developing plans, providing political support, and encouraging a sharing of knowledge and best practice through seminars, workshops, study visits, parliamentary briefings, ministerial meetings, and newsletters.

<http://www.tcpa.org.uk/new-communities-group>



## Other resources

### ***Accelerated Construction: Local Authorities***

Department for Communities and Local Government, Jan. 2017

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/581520/Accelerated\\_construction\\_Eol.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/581520/Accelerated_construction_Eol.pdf)

### ***'Design: process and tools'. Planning Practice Guidance***

Ministry of Housing, Communities and Local Government. Mar. 2014, updated Oct. 2019

<https://www.gov.uk/guidance/design>

### ***Factory-Made Housing: A Solution for London?***

New London Architecture, Oct. 2018

<https://www.newlondonarchitecture.org/whats-on/publications/all-nla-publications/factory-made-housing-a-solution-for-london>

### ***The Farmer Review of the UK Construction Labour Model***

Construction Leadership Council, Oct. 2016

<http://www.cast-consultancy.com/wp-content/uploads/2016/10/Farmer-Review-1.pdf>

### ***Fixing Our Broken Housing Market***

Cm 9352. Housing White Paper. Ministry of Housing, Communities and Local Government, Feb. 2017

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/590463/Fixing\\_our\\_broken\\_housing\\_market\\_-\\_accessible\\_version.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/590463/Fixing_our_broken_housing_market_-_accessible_version.pdf)

### ***Garden Communities***

Ministry of Housing, Communities and Local Government, Aug. 2018

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/805688/Garden\\_Communities\\_Prospectus.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/805688/Garden_Communities_Prospectus.pdf)

### ***Government Response to the Communities and Local Government Select Committee Report: Capacity in the Homebuilding Industry***

Cm 9517. Department for Communities and Local Government, Oct. 2017

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/651027/CM9517\\_print.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/651027/CM9517_print.pdf)

### ***Government Response to the Housing, Communities and Local Government Select Committee Report on Modern Methods of Construction***

CP 168. Ministry of Housing, Communities and Local Government, Sept. 2019

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/832176/SC\\_168\\_-\\_modern\\_methods\\_of\\_construction.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/832176/SC_168_-_modern_methods_of_construction.pdf)

### ***The Impact of Modern Methods of Construction on Skills Requirements for Housing***

CITB (Construction Industry Training Board), Apr. 2019

<https://www.citb.co.uk/global/research/citb-mmcr-report-mar-2019.pdf>

### ***An Introduction to the Home Building Fund***

Homes England, Sept. 2018

<https://www.gov.uk/government/publications/home-building-fund>

### ***Laying the Foundations for MMC: Expanding the Role of Modern Methods of Construction. One Potential Solution to the UK Housing Crisis***

Building Societies Association, Nov. 2016

<https://www.bsa.org.uk/BSA/files/20/20cee386-9dc6-4e0e-9ae9-504e3bbe4171.pdf>



V Pinoncely and E Belcher: ***Made for London: Realising the Potential of Modern Methods of Construction***

Centre for London, Sept. 2018

<https://www.centreforlondon.org/publication/made-for-london/>

S Oliveira, J Burch, K Hutchison, O Adekola, S Jaradat and M Jones: ***Making Modular Stack Up: Modern Methods of Construction in Social Housing***

University of the West of England, for Flagship Group *et al.*

<https://www.flagship-group.co.uk/media/1921/full-report-final.pdf>

***MMC for Affordable Housing Developers: A Housing Forum Guide to Overcoming Challenges and Barriers***

Housing Forum, Sept. 2019

<https://www.housingforum.org.uk/publications/housing-forum-reports->

***Modern Methods of Construction***

HC 1831. Fifteenth Report of Session 2017-19. Housing, Communities and Local Government Committee. House of Commons, Jul. 2019

<https://publications.parliament.uk/pa/cm201719/cmselect/cmcomloc/1831/1831.pdf>

***Modern Methods of Construction: A Forward-Thinking Solution to the Housing Crisis?***

Royal Institution of Chartered Surveyors, Sept. 2018

<https://www.rics.org/globalassets/rics-website/media/news/news—opinion/modern-methods-of-construction-paper-rics.pdf>

***Modern Methods of Construction: Introducing the MMC Definition Framework***

Modern Methods of Construction Joint Industry Working Group. Ministry of Housing, Communities and Local Government, Mar. 2019

<https://www.gov.uk/government/publications/modern-methods-of-construction-working-group-developing-a-definition-framework>

***Modern Methods of Construction: Views from the Industry***

NHBC Foundation, Jun. 2016

<https://www.nhbcfoundation.org/publication/modern-methods-of-construction-views-from-the-industry/>

***Modern Methods of Construction: Who's Doing What?***

NHBC Foundation, Nov. 2018

<https://www.nhbcfoundation.org/wp-content/uploads/2018/11/NF82.pdf>

***Ten Characteristics of Places where People Want to Live***

RIBA Response to the Independent Review of Build Out Rates by Sir Oliver Letwin MP. Royal Institution of British Architects, Oct. 2018

<https://www.architecture.com/-/media/gathercontent/work-with-us/additional-documents/placeswherepeoplewanttolivepdf.pdf>

***Written Evidence Submitted by the Association of British Insurers***

MMC 029. Evidence submitted to the Housing, Communities and Local Government Committee Inquiry on Modern Methods of Construction, Jan. 2019

<http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/housing-communities-and-local-government-committee/modern-methods-of-construction/written/95724.pdf>