

Modern Methods of Construction in Greater Lincolnshire

Stage 1: Evidence Base and Making the Case for Intervention

On behalf of North Kesteven District Council, City of Lincoln Council, South Holland District Council, Boston Borough Council, East Lindsey District Council, North East Lincolnshire Council and Lincolnshire County Council



Contents

| | |
|-----------------------------------------------------------------------|-----|
| Executive Summary..... | i |
| 1. Introduction..... | 1 |
| 2. MMC sector review | 3 |
| 3. MMC: Supply-side factors in a Greater Lincolnshire context..... | 35 |
| 4. MMC: Demand-side drivers in a Greater Lincolnshire context..... | 58 |
| 5. Conclusions: SWOT analysis and the rationale for intervention..... | 81 |
| | |
| Annex A: stakeholders consulted..... | A-1 |

Contact:

James Kinnersly

Tel: 07708327543

email: jkinnerly@sqw.co.uk

Approved by:

Andy Smith

Director

Date: 15/12/2022

Disclaimer

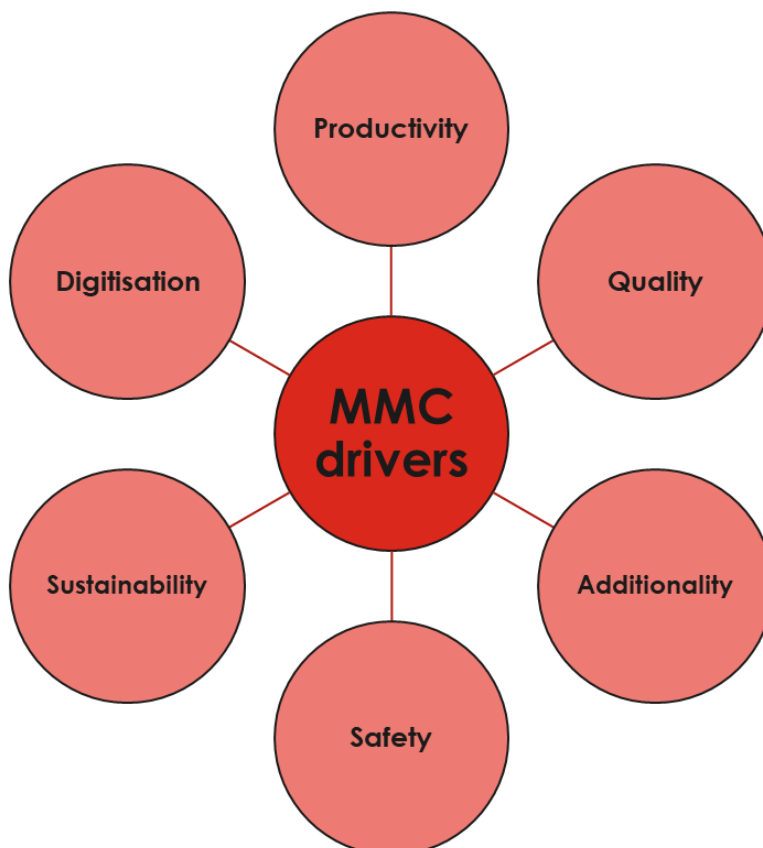
This report takes into account the particular instructions and requirements of our client. It is not intended for, and should not be relied upon by, any third party and no responsibility is undertaken to any third party.

Whilst SQW has used reasonable care and skill throughout, it is unable to warrant either the accuracy or completeness of information supplied by the client or third parties, and it does not accept responsibility for any legal, commercial or other consequences that arise from its use.

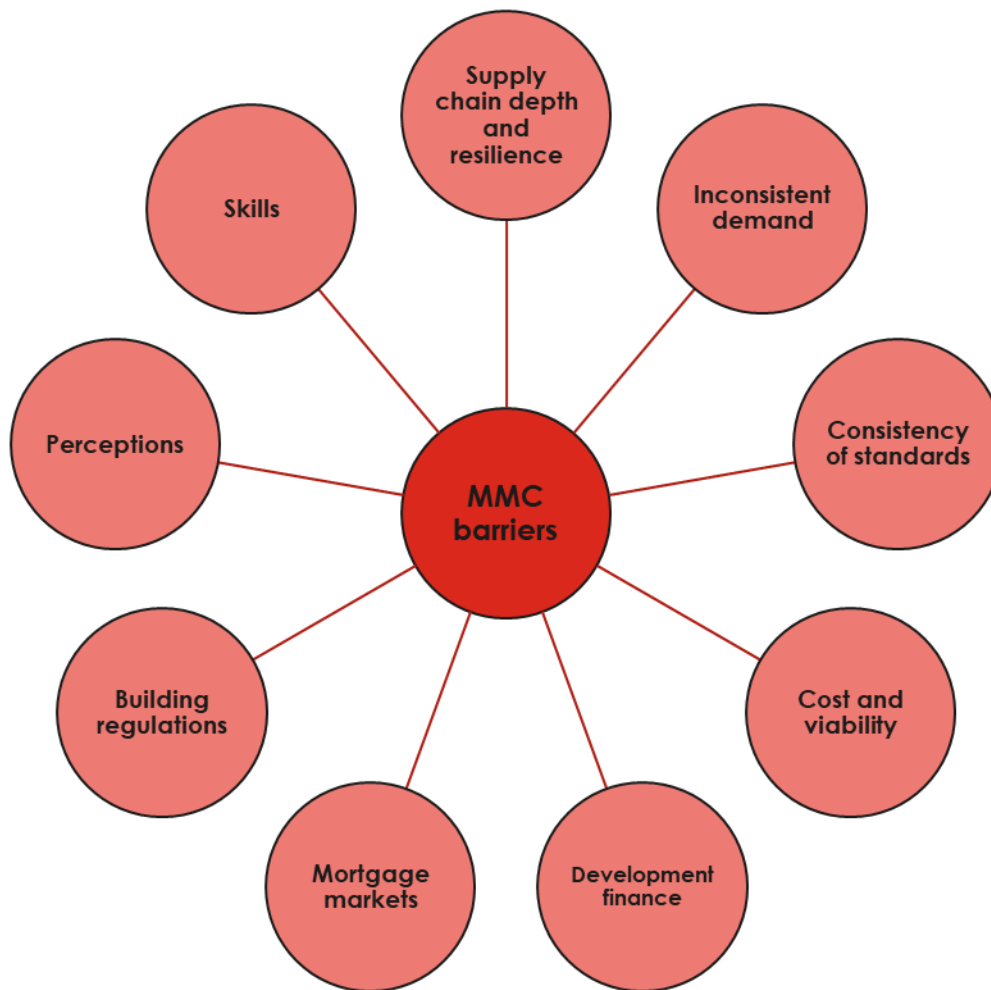
Executive Summary

Context

1. The UK's construction sector faces a number of significant challenges: an ageing and declining workforce, insufficient new and skilled entrants being trained to join the workforce, and stagnating productivity in the context of both a housing crisis and the ever-worsening climate emergency.
2. Several climate emergency driven legislative drivers will begin to significantly influence housing delivery across the UK: Future Homes Standard in 2025 and the UK Government's 2050 net zero aspirations.
3. Modern Methods of Construction (MMC) are a policy priority for the UK Government. Utilising off-site manufacturing technologies and systems to deliver homes at scale, more quickly, cheaply and sustainably is the central challenge for the sector, including for Greater Lincolnshire.
4. Key drivers of the MMC sector are summarised in the diagram below:



5. The MMC sector nationally is still relatively in its nascency and whilst it is growing – with a wide range of products, technologies, manufacturing systems and delivery models in evidence - there remain a number of key barriers to the sector's growth, summarised in the diagram below:



6. The construction sector in Greater Lincolnshire – inclusive of MMC – is not identified as a strategic economic sectoral priority. Greater Lincolnshire’s existing MMC manufacturing base is very limited, with very few manufacturers operating in this space.
7. Whilst Greater Lincolnshire as a whole is mostly delivering enough homes to meet identified need, there are specific locations where insufficient housing is being delivered.
8. Housing delivery (highly geographically specific) challenges across Greater Lincolnshire include: challenging market viability, flood risk, significant infrastructure delivery burdens, limited scale of development sites, a dispersed rural geography, the challenges of retrofitting existing stock and the relative undersupply of construction skills. These challenges can be particularly acute for some MMC systems and delivery models.... different approaches to the promotion of MMC will be required to account for locational variation
9. Affordable housing stock holders across Greater Lincolnshire – including local authorities, Registered Providers and their supply chains – are beginning to innovate and deliver schemes utilising MMC in response to Homes England funding and policy requirements.
10. However, there is relatively little evidence of market housing developers and housebuilders engaging with MMC – with costs of MMC cited as a major factor - particularly with Greater Lincolnshire’s construction and housing sector being characterised by relatively traditional

SME companies, and a relatively small presence of those national housebuilders which are innovating with MMC.

The Rationale for Intervention

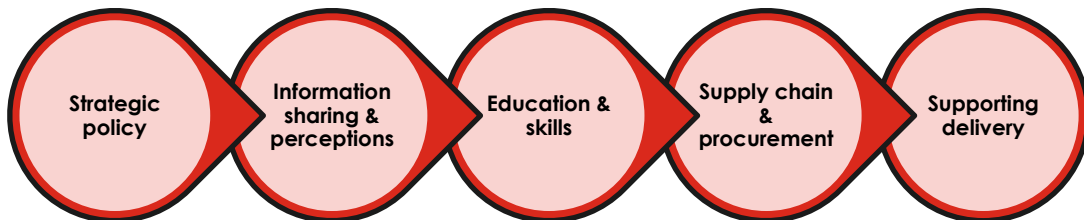
11. There is a disconnect between the strategic drivers and challenges identified facing the construction sector and housing delivery and the response of the market – noting that there are funding and legislative drivers already pushing the affordable housing sector to engage.
12. Housebuilders and their supply chains in Greater Lincolnshire have little to no short-term incentive to change their methods and models of delivering market homes for a range of reasons:
 - there is no binding legislative imperative to change on the immediate horizon
 - there is insufficient market pressure or demand from the end consumer to drive a change in approach / product
 - there is a lack of awareness and understanding within Greater Lincolnshire’s housebuilding sector more generally of the potential opportunities associated with a diverse range of MMC products and systems.
 - there remain challenges with the feasibility and viability of many MMC products and systems, particularly in the context of the frequently small-scale residential sites delivered using traditional methods by SMEs which characterise Greater Lincolnshire and the significant geographic variation in terms of deliverability and viability – particularly for market housing.
13. However, legislative drivers are on the horizon in the medium term (i.e. 2025) – particularly focused on sustainability – and the structural challenges affecting the UK’s construction sector labour market will be felt ever more acutely in a Greater Lincolnshire context.
14. Failure to respond to or engage with the legislative and policy drivers focused around the Future Homes Standard and net zero would represent a significant threat to Greater Lincolnshire’s housebuilding and construction sector.
15. The implications for failing to engage – for instance investing in training and skills, the expansion of supply and stimulation of demand - could include a drop-off in the ability of Greater Lincolnshire’s housing sector to deliver enough homes to meet demand. This in turn could result in acting as a key constraint for Greater Lincolnshire’s future economic growth.
16. Increasing capacity to deliver new homes using MMC will therefore be key to responding to these drivers – it will be particularly important to support SME developers and contractors which are a key feature of Greater Lincolnshire’s residential sector.
17. There is, therefore, a rationale for public intervention to overcome the disconnect between the lack of MMC capacity and engagement in Greater Lincolnshire’s housing market due to the barriers identified and the imperative of the identified strategic drivers

18. However, recognising that the affordable housing sector is already at the forefront of engaging with MMC in Greater Lincolnshire relative to developers of market housing – albeit still at a relatively early stage - interventions will need to be targeted accordingly, supporting each sector as appropriate relative to the current stage of their engagement.
19. The delivery of affordable housing using MMC – both by local authorities and Registered Providers – will continue to act as an important stimulus for the sector in Greater Lincolnshire and will be a key driver of demand. This should continue to be supported.
20. Interventions will also need to account for geographic variation in terms of viability and delivery challenges, and recognise that the timeframes for intervention in these instances may well be much longer term.
21. The response required will necessitate both demand and supply side interventions in the context of current low levels of engagement and delivery of MMC – this will avoid the ‘chicken and egg’ scenario.
22. Encouraging the growth of MMC manufacturing capacity will also be an important of the strategy to support the future resilience of Greater Lincolnshire’s construction sector, recognising that in the medium-long term an increasing proportion of jobs in construction nationally will be factory-based and there is an opportunity for Greater Lincolnshire to participate in the expansion of this sector, and the associated productivity and employment gains, also leveraging the potential for transferable skills between both existing construction sector employees and other manufacturing sectors in Greater Lincolnshire, particularly in the north of the region.

Proposed overarching objectives as the basis for a SMART Action Plan

23. **Strategic Objective 1:** To enhance the scale, resilience and capacity of Greater Lincolnshire’s housebuilding sector – both public and private – in the medium-long term through catalysing the increased utilisation of MMC systems and technologies to deliver more homes, more quickly, efficiently, and sustainably.
24. **Strategic Objective 2:** To support the expansion of Greater Lincolnshire’s MMC manufacturing base and related supply chains to deliver productivity, employment and sustainable outcomes as well as contributing to an increasingly resilient labour market sustaining green jobs for the future.
25. **Strategic Objective 3:** To recognise the significant diversity of viability and delivery challenges for housing delivery across Greater Lincolnshire by adopting a nuanced, locationally appropriate approach to promoting MMC which is sensitive to context and particularly attuned to the needs of SMEs operating in this sector: applying an Action Plan flexibly, attuned to locational needs.

- 26. Strategic Objective 4:** To position Greater Lincolnshire as a pioneer in sustainable construction through its prioritisation as an economic sector as a platform for unlocking the benefits associated with increased engagement with MMC in housing delivery.
- 27. Strategic Objective 5:** To achieve this through collaborative, multi-stakeholder working across five thematic priority areas addressing both demand and supply side factors:



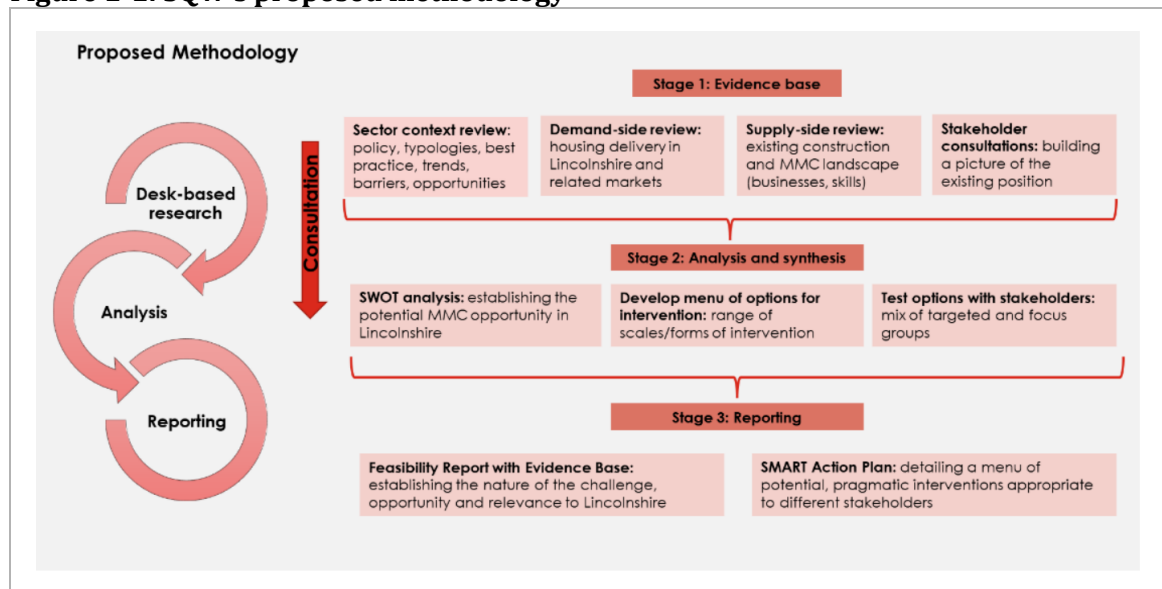
Platform for a SMART Action Plan

- 28.** Importantly, it is acknowledged that there is significant diversity across Greater Lincolnshire. The challenges and opportunities relevant and applicable in Boston, might not be the same for the City of Lincoln. This being said, this study has sought to position its conclusions and recommendations for developing the Action Plan at an aggregated level: fundamentally the advance and development of the MMC sector requires delivery at scale in response to both demand and supply side drivers. Given the nascency of the use of MMC systems and products in Greater Lincolnshire, particularly in market housing delivery, and the fragmented extent of awareness and engagement, it will be challenging for isolated interventions solely delivered at the level of individual local authorities to deliver the step change required to genuinely drive additional capacity and engagement with MMC across the County.
- 29.** Clearly not all conclusions and recommendations resulting from this study informing the Action Plan will apply to all local authority areas or stakeholder. However, the intention is to provide a collective evidence base and a framework for action and future implementation which the client group, and related stakeholders, can utilise as an organising agenda and platform for progressing and developing specific interventions in collaboration with relevant and engaged stakeholders and partners.

1. Introduction

- 1.1** SQW has been instructed by North Kesteven District Council, City of Lincoln Council, South Holland District Council, Boston Borough Council, East Lindsey District Council, North East Lincolnshire Council and Lincolnshire County Council (the Local Authorities) to undertake a solutions focused study focused on Modern Methods of Construction (MMC) in a Greater Lincolnshire context. This study is required to both articulate the specific challenges and opportunities relating to MMC, alongside the identification of pragmatic and potentially innovative interventions which could be deployed to upscale MMC capacity and delivery in Greater Lincolnshire, specifically in the context of residential housing delivery.
- 1.2** This study has followed a three-stage process, as detailed in Figure 1-1 below.

Figure 1-1: SQW's proposed methodology



Source: SQW

- 1.3** This evidence base report encompasses the output of Stage 1 of this process, presenting the conclusions of the review of the MMC sector, demand-side and supply-side considerations, supplemented by targeted stakeholder consultations (see Annex A for a list of consultees).
- 1.4** The report concludes by presenting SWOT analysis (shown as falling within Stage 2 of Figure 1-1) synthesising the findings and establishing the rationale for intervention and the potential opportunity.
- 1.5** This report provides the platform for Stage 2, where SQW and stakeholders will reflect on the Stage 1 evidence base to identify, design and test potential interventions which could form the basis of a SMART Action Plan.
- 1.6** It is important to note that this evidence base report represents a moment in time and has been undertaken at a deliberately high-level in order to capture a broad range of factors and

considerations. Accordingly, the evidence base reviewed is intended to be representative rather than exhaustive. For example, the MMC sector is fast-evolving with the landscape of new entrants and technologies changing rapidly, in addition to many existing firms supplying the traditional construction sector also participating in MMC supply chains; we have therefore not sought to map or identify every single business engaged in the MMC sector as this would be overly complex and disproportionate for the purposes of this study. Similarly, we have undertaken a review of the potential housing pipeline across Greater Lincolnshire drawn from a review of adopted and emerging Local Plans and their underpinning evidence base. The snapshot we have taken is at a specific point in time – clearly the policy and evidence base preparation process is ongoing – and we have not sought to get overly caught up in overly-granular analysis at a site-specific level, but instead have focused on establishing the ‘order of magnitude’ in terms of projected housing need, historic rates of housing delivery, key locations for delivery, principal housing typologies and allocation sizes.

A note on consultations

1.7 SQW has consulted with a number of stakeholders to inform this study. Given the number of local authorities within the study area and the geographic range consultations have taken place with a number of organisations engaged with construction in Greater Lincolnshire in differing capacities:

- i) Developers / housebuilders
- ii) Registered Providers
- iii) Local authorities which deliver new homes
- iv) Contractors
- v) Homes England
- vi) Further Education providers
- vii) Higher Education providers

1.8 Not all of the organisations consulted are active across Lincolnshire and the intention is not to have achieved comprehensive coverage; instead the selection of consultees – listed in full at Annex A – is intended to be broadly representative of the construction sector in Greater Lincolnshire in general terms. Furthermore, the study has been informed by SQW’s experience of delivering research and project-based commissions around the UK involving alternative MMC manufacturers and developers utilising these systems.

2. MMC sector review

Overview

- 2.1** This section provides a high-level contextual overview of the MMC sector, principally focusing on the following areas:
- Defining MMC
 - The strategic context
 - The policy context
 - Drivers of MMC
 - Barriers to MMC
 - Overview of key MMC organisations and industry trends
- 2.2** This contextual summary is provided ahead of a more focused discussion of demand and supply-side drivers and barriers for the MMC sector in a Greater Lincolnshire context.

Defining Modern Methods of Construction (MMC)

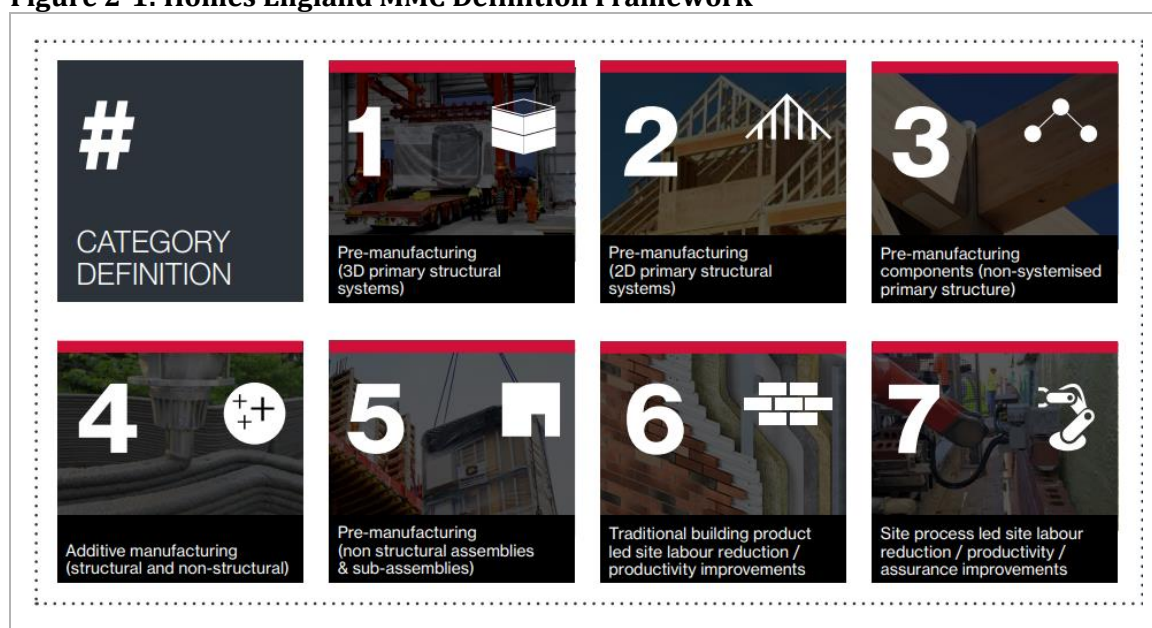
- 2.3** Before defining MMC it is important to define what is termed as ‘traditional’ construction. Traditional construction is predominantly undertaken on-site: materials are transported to and assembled on-site along with the majority of the steps required to construct the building (sub-structure, super-structure, fit-out etc). The construction steps typically proceed in a linear / sequential way with each stage typically needing to be completed prior to commencing the next stage.
- 2.4** In the context of the traditional construction process, MMC can be defined relatively broadly. In 2005, the National Audit Office (NAO) defined MMC as **‘a process to produce more, better quality homes in less time’¹**.
- 2.5** Another, more developed, definition considered by the Government is **‘a collective term for a wide range of non-traditional building systems. These include modular construction where units are fully fitted out off-site, panelised systems (such as timber or light steel frames, site based MMC such as thin joint block work and sub-assemblies and components (such as pre-fabricated chimneys, porches etc).’²**
- 2.6** Beyond defining MMC – which is clearly a broad spectrum of non-traditional building systems – it is therefore important to categorise types of MMC.

¹ National Audit Office. November 2005. Using modern methods of construction to build homes more quickly and efficiently.

² Communities and Local Government Committee, Tenth Report of Session 2016–17, Capacity in the homebuilding industry, HC 46, para 2

2.7 Over the last 15-20 years there has been widespread acknowledgement of the importance of MMC to boosting the productivity of the construction sector, with significant research, policy development, funding, testing and delivery undertaken by a range of public, private and third sector organisations in all areas of construction. Recognising the breadth and complexity of the MMC sector as a whole, and the range of definitions available, this report adopts Homes England's definition and categorising of MMC. This high-level categorisation is provided below in Figure 2-1.

Figure 2-1: Homes England MMC Definition Framework



Source: Modern Methods of Construction: introducing the MMC definition framework (Cast Consultancy on behalf of Homes England, 2019)

2.8 Importantly, the framework definition was commissioned by Homes England to regularise interpretation and application of MMC across the sector and has been adopted by the RICS in relevant standards and guidance.

2.9 Categories 1-5 are regarded as 'off-site and near site pre-manufacturing' and Categories 6-7 are considered to represent 'site-based process improvement' applicable to traditional construction projects. Further detail is provided in the MMC Definition Framework regarding the composition of each category, with a summary provided below in Table 2-1.

Table 2-1: Homes England MMC Definition Framework – Category Explanations

| Category | Category explanation |
|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <p>Pre-manufacturing (3D primary structural systems)</p> <ul style="list-style-type: none"> Systemised approach based on volumetric construction that produces a 3D unit in a controlled factory prior to final installation Variation in product – might be fitted out or not fitted out; can be used in isolation or in combination with traditional methods |

| Category | | Category explanation |
|----------|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2 | Pre-manufacturing (2D primary structural systems) | <ul style="list-style-type: none"> • Systemised approach using flat panels for basic floor, wall and roof structures made in a factory and assembled on-site • Open panel vs closed panel (i.e. insulation, windows, services, cladding etc might be installed in the factory) |
| 3 | Pre-manufacturing components (non-systemised primary structure) | <ul style="list-style-type: none"> • Pre-manufactured structural components – i.e. pre-cast concrete, framed or mass engineered timber • Mostly super-structure but might include some sub-structure – i.e. pre-fabricated ring beams, pile caps |
| 4 | Additive manufacturing (structural and non-structural) | <ul style="list-style-type: none"> • Printing parts of buildings based on digital design and manufacturing – might be on or off-site |
| 5 | Pre-manufacturing (non-structural assemblies and sub-assemblies) | <ul style="list-style-type: none"> • Pre-manufacturing non-structural components – i.e. non-structural walling • Might include non-load bearing volumetric units like bathroom pods and utility cupboards |
| 6 | Traditional building product led with site labour reduction or productivity improvements | <ul style="list-style-type: none"> • Traditional single building products manufactured in a large format, pre-cut configuration or with easy jointing features to reduce on-site labour required to install |
| 7 | Site process led labour reduction, productivity, or assurance improvements | <ul style="list-style-type: none"> • Innovative site-based construction techniques that improve site process efficiencies (i.e. BIM connected delivery framework with digitally enabled workflow planning; modular / standardised temporary works etc). |

Source: Modern Methods of Construction: introducing the MMC definition framework (Cast Consultancy on behalf of Homes England, 2019)

2.10 Whilst this framework for categorising different MMC systems is relatively new, as are many of the systems themselves it is worth noting that there are also examples of existing systems or technologies embedded within traditional construction processes – for example off-site manufacturing of timber roof trusses – which also fall within these categories.

2.11 A key concept introduced by the MMC Definition Framework is that of **‘pre-manufactured value’ (PMV)**. PMV measures the proportion of a project made-up of on-site labour, supervision, plant and temporary works. Increasing manufacturing and/or reducing site labour can improve PMV³. This concept is particularly important in the context of, for example, Homes England funding and disposals (discussed later in this paper).

³ Cast Consultancy on behalf of Homes England (2019) Modern Methods of Construction: Introducing the MMC Definition Framework

The strategic context

Key points

- The construction sector is facing a growing workforce and skills shortage
- Significant pressures on construction cost inflation and supply chain volatility – look set to continue
- National housing shortage – consistent national-scale failure to deliver the required supply
- Growing importance of ESG factors on decision-making for investors, developers and construction companies

2.12 The national focus on MMC is particularly acute in the context of structural challenges facing the construction sector. Whilst the key drivers – including policy – are identified in more detail below, it is important to contextualise some of the broader challenges facing the construction sector.

2.13 The first principal factor impacting on the construction sector relates to **workforce and skills shortages**. This is a long-standing issue exacerbated by a range of factors but cumulatively resulting in both existing workforce and skills shortages, and significant forecast future skills shortages. For instance, it has been estimated that the mainstream construction workforce – which has become increasingly demographically skewed towards an older profile - will reduce by 20-25% over the next 10 years and new level of entrants will not be able to fill this gap⁴. Other contributing factors include the trend of fewer EU nationals in the construction workforce following the UK's departure from the European Union⁵. Recent projections estimate that the UK's construction industry will need to recruit an extra 266,00 workers over the next five years to meet the projected demand⁶.

2.14 A further contextual factor is the macro-economic context which is putting significant **pressure on both supply chains and build costs**. The weakening of the pound, price inflation, the energy crisis and material shortages are all contributing to a significant increase in build costs since 2021. The Builder Merchants Federation (BMF) reported in the Builder Merchant Building Index that in Q1 2022 the value of sales increased by 17.7% when compared with Q1 2021 while volume increased by just 1.5%⁷. Therefore, indicating that the driving force is increased prices not volume. Annual material price inflation has increased to over 20% in May 2022 for several materials⁸. Steel products are facing larger increases of

⁴ RICS. September 2018. Modern Methods of Construction: A forward-thinking solution to the housing crisis?

⁵ Construction Industry Training Board (2022) Construction Skills Network: the skills construction needs – Five-year outlook 2022-26

⁶ Ibid.

⁷ Builder Merchants Federation. May 2022. Builders Merchant Building Index: Quarter 1 2022.

⁸ BEIS. May 2022. Monthly Statistics of Building Materials and Components. Accessed here

53% - 65% compared to May 2021 because their energy intensive processes are facing increased energy costs which they are passing on to buyers⁹. Additionally, stretched supply chains further intensify challenges as the industry faces a significant number of unfilled orders leading to construction delays, increased costs due to longer development programmes and labour costs.

2.15 Within this context there is also a **significant under-supply of new housing at a national level**, the result of a consistent failure in recent decades to deliver sufficient homes annually to meet growing needs. This report does not seek to articulate the different dimensions and complexities of the housing crisis, However, it is sufficient to understand that the UK Government has set a 300,000 homes per annum target for housing delivery, yet in the year 2020/21 only 216,490 net new homes were delivered¹⁰, illustrating the scale of the annual shortage.

2.16 A further contextual factor is the **increasing importance for lenders, investors and shareholders of ESG** (environmental; social; governance) sustainability factors in shaping their investment decisions. For example, Savills report that currently 30% of the shareholders of housebuilders have an ESG focus¹¹.

The policy context

Key points

- The Government is consistently placing emphasis on increasing the UK economy's productivity – the construction sector is included here, with a key role for MMC in achieving this outcome
- Significant emphasis and guidance issued by the Government to public sector bodies to use their levers to drive increased construction productivity through supporting and facilitating MMC
- Homes England, using its various funding and policy levers, is prioritising MMC using a number of different mechanisms (direct investment, funding criteria etc)
- Homes England has driven efforts to standardise definitions and categorising of the MMC sector and its constituent categories / technologies – overall it is placing a strong focus on volumetric and panellised technologies and processes which have a high 'pre manufactured value' (PMV), known as Category 1 and Category 2 technologies

⁹ BEIS. May 2022. Monthly Statistics of Building Materials and Components. Accessed here

¹⁰ DLUHC Statistical Release – Housing supply; net additional dwellings, England: 2020-21, November 2021

¹¹ Is there green finance pressure on housebuilders to decarbonise? 6 May 2021, Savills

2.17 Set against this wider context, the UK Government made the modernising of the construction industry a key priority. **The Construction Sector Deal** was launched in 2018 as part of the UK's Industrial Strategy, which incorporated three key principles:

- **Digitising** – Delivering better, more certain outcomes using digital technologies.
- **Manufacturing** - improving productivity, quality and safety by increasing the use of manufacturing.
- **Performance** – optimising whole life performance through the development of energy efficient, smart assets¹²

2.18 MMC embodies these three key principles, particularly through its focus on off-site manufacturing (to varying degrees) which represents a genuine disruption to traditional methods of construction. For instance, off-site manufacturing has a completely different structure and workflow compared to traditional building as value generation is focused at the design and assembly phase which results in productivity and digitisation benefits¹³.

2.19 The UK Government recognises the potential benefits of MMC, including the potential to speed up delivery, provide efficiency gains, improve sustainability outcomes, reduce costs and modernise the industry.

“
**Aggregating and
standardising our demand
will increase the use of MMC**

2.20 The **UK Government's Construction Playbook** sets out guidance around how the Government will assess, procure and management public work projects and programmes. One of its key policies is encouraging **more innovation and increased use of MMC**¹⁴.

2.21 The Construction Playbook incorporates and addresses MMC in a number of ways, but importantly it recognises the role the public sector can play in driving the market, encouraging collaborative working between local authorities to **'harmonise, digitise and rationalise demand'**, to support the creation of a more resilient pipeline, drive efficiencies, innovation and productivity¹⁵.

2.22 The Construction Playbook further makes recommendations that the public sector could use intelligent target setting, where appropriate, to drive demand for MMC – where it can be demonstrated that this really adds value.

¹² UK Government. July 2018. Construction Sector Deal.

¹³ RICS. September 2018. Modern Methods of Construction: A forward-thinking solution to the housing crisis?

¹⁴ UK Government, The Construction Playbook, December 2020

¹⁵ UK Government, The Construction Playbook, December 2020

2.23 Delivering ‘Greener Buildings’ is one of the key strands of the UK Government’s ‘Ten Point Plan for a Green Industrial Revolution’¹⁶, with MMC further cutting across many of the other stands focused on delivering green infrastructure across all sectors.

2.24 In this context **Homes England** identified supporting MMC as one of its seven core priorities in its most recent **Strategic Plan**¹⁷, setting itself targets in terms of delivering / facilitating the delivery of completions using MMC. Homes England is focused on boosting supply, productivity, innovation, quality and skills in the housing market, with MMC being a key mechanism for achieving these goals.

2.25 Homes England has a range of tools at its disposal to deliver new homes, ranging from grant funding programmes, financing (loans), direct investments / partnerships, delivery of homes on public land etc. MMC has increasingly been ‘hard coded’ into these mechanisms. For example, through its funding criteria (i.e. 25% of affordable homes being delivered by Strategic Partnerships and being funded via the Affordable Homes Programme 2021-26 will need to be delivered using MMC, targeting a PMV of 55%¹⁸) and also leasing mechanisms (i.e. land disposals requiring housebuilders to deliver a proportion of homes using MMC). Homes England recognise that their role is both to stimulate MMC through demand-side interventions (i.e. funding and delivery), but also in terms of building capacity in the industry through investing in and supporting MMC manufacturers and the supply chain¹⁹.

Drivers of MMC

Key points

- Key drivers of the overall MMC sector:
 - a) Productivity – cost and programme
 - b) Quality – standardisation etc
 - c) Additionality – adding to existing supply and attracting new investment
 - d) Safety – factory conditions vs on-site risks
 - e) Sustainability – less waste, greater use of timber, lower carbon etc
 - f) Digitisation – use of integrated design, manufacture and operational systems to increase efficiency

2.26 There are a number of benefits to MMC, referred to here as ‘drivers’, relative to traditional construction methods. These are summarised in Figure 2-2 and detailed more fully below. This review only focuses on the principal drivers, recognising that there are other drivers

¹⁶ UK Government, Ten Point Plan for a Green Industrial Revolution, November 2020

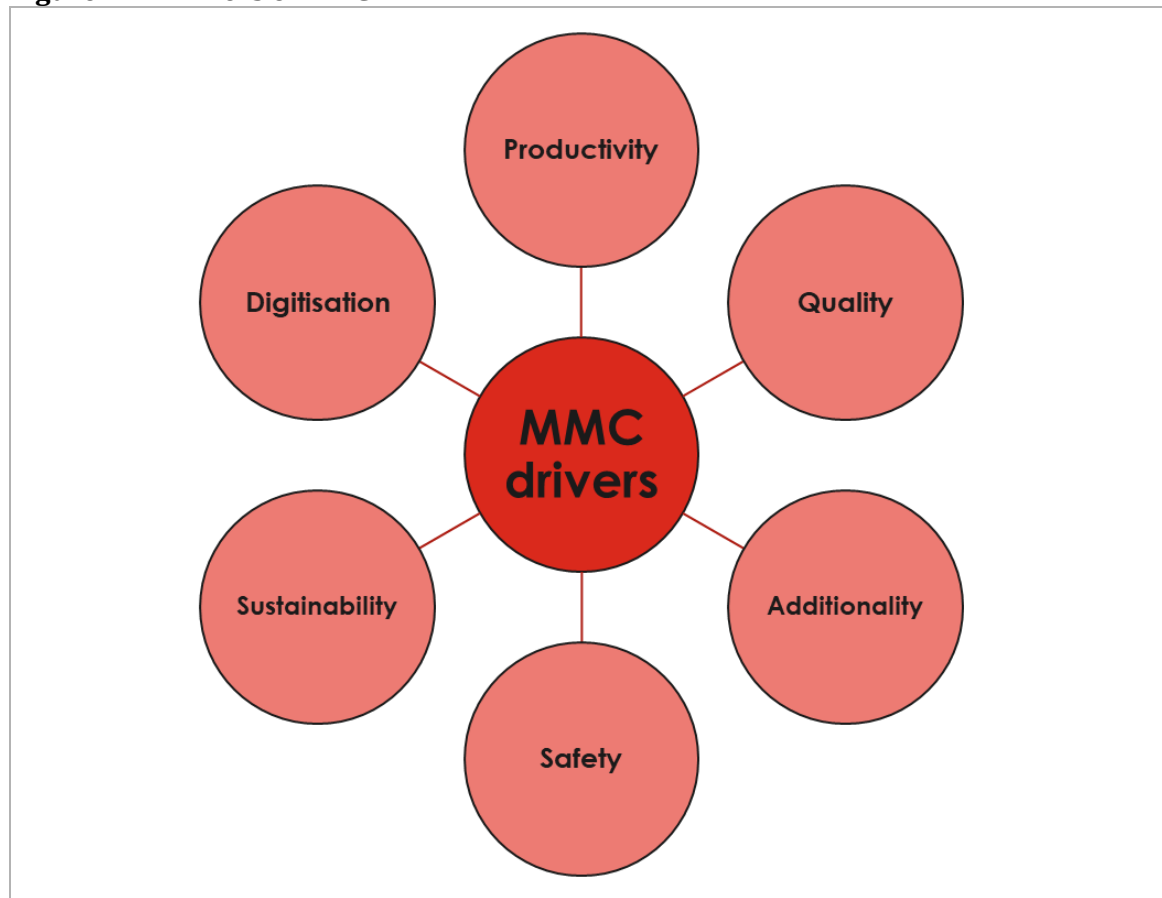
¹⁷ Homes England Strategic Plan 2018/19 – 2022/23

¹⁸ Homes England, Capital Funding Guide

¹⁹ Homes England Strategic Plan 2018/19 – 2022/23

relevant depending on MMC category, system and technology. These drivers are those applicable to the whole MMC sector.

Figure 2-2: Drivers of MMC



Source: SQW analysis

Productivity

2.27 There are a number of dimensions to the productivity benefits arising from MMC techniques:

- **Reduced overall programme** - it is estimated that utilising MMC techniques can reduce construction programme timescales by 20-60%²⁰.
- **Shorter time on-site (reduced risk)** – off-site manufacture in a controlled environment leads to a more predictable process with less time required for on-site construction and the risk of delays from adverse weather conditions.
- **Greater cost certainty** – greater control over the process and reduced exposure to on-site conditions and risks, combined with the frontloading of detailed design (pre-manufacture) leads to overall greater cost certainty – particularly where there is early

²⁰ Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

collaboration between designers, contractors, manufacturers, and suppliers at the outset of the process to ensure sufficient time to resolve and coordinate design inputs.

- **Reduced build cost** – through a combination of the above factors which reduce programme and increase cost certainty earlier in the process, together with the benefits of a manufacturing-led approach through achieving economies of scale, MMC methods, hypothetically, could lead to reduced build costs. Evidence presented to a House of Lords Select Committee indicated cost reductions of MMC techniques could be in the region of 10-40%²¹. This being said, the case for cost reductions being achieved particularly through volumetric products is not yet firmly established given the relative nascency of the sector and challenges with achieving economies of scale at this stage – this is addressed in more detail below in the ‘barriers’ section.
- **Reduced development financing costs** – a function of the shorter delivery period, whilst typically off-site manufacturing places a greater burden on cashflow from the perspective of frontloading payments ahead of manufacture, as the construction period is far shorter there is a reduced burden on financing costs prior to completion and generation of sales receipts.
- **Increased labour productivity** – Studies have found that off-site production of building components can be significantly more labour productive than traditional on-site activities; additionally, the rate of off-site productivity growth (2.32%) is greater compared with comparable on-site sectors (1.43%)²². Additionally, there are reduced logistical issues such as fewer road closures during significant periods of construction due to a reduced time on site. Less vulnerability to weather, less reliance on skilled trades, less travel for workers, concurrent working between different specialities, and enhanced opportunities for automation all lead to productivity improvements²³. A research project by Bristol City Council examined the benefits of MMC using real-life MMC housing projects as case studies. One of the research partners carried out a time analysis that showed concurrent working is a key benefit of MMC (as shown in Figure 2-3).]

Figure 2-3: Time analysis of an MMC factory production and installation of 25 MMC housing units on site.



Source: Bristol City Council. Accessed [here](#)

²¹ House of Lords. Science and Technical Select Committee. 2018. Off-site manufacture for construction: Building for change & Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

²² Pan, W. and Goddier, C., 2012. Housebuilding business models and offsite construction take-up. Journal of Architectural Engineering, 18 (2), pp. 84 - 93.

²³ House of Lords. Science and Technical Select Committee. 2018. Off-site manufacture for construction: Building for change & Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

- Economies of scale** – MMC manufacturing processes lend themselves to economies of scale bringing down costs as volume increases (assuming consistent product). MMC is well suited to sectors that require high volume, repetitive designs that can be made in a factory and transported to site. This results in MMC solutions being beneficial to volume housebuilders who have repeatable house types and designs. MMC is particularly appropriate for affordable housing because of the high volume, repetitive designs, and the need to deliver homes fast by Housing Associations or Registered Providers who are not influenced by cyclical market dynamics. To keep costs low and provide supply chain certainty, bulk orders are necessary to create economies of scale. Housing Associations and local authorities are encouraging collaboration to help drive demand for certain MMC products²⁴ in order to drive certainty within supply chains. Swan Housing Association and Accord Homes have integrated into the supply chain and built their own off-site factories²⁵.

Quality

- 2.28** The repeatable manufacturing process of producing homes in a factory environment can result in consistent high standards and better-quality products compared to traditional build methods. Even with very diligent on-site teams, the traditional method of building homes on site are affected by weather conditions and the use of manual labour can make delivering a quality product more difficult than in a factory environment²⁶. The factory environment allows for easier quality assurance processes which in turn have been found to lead to reduce snagging²⁷. The consistency of approach, consistent of the product, ease of access to training for construction apprenticeships, and greater application of quality control procedures provide short-term commercial benefits as well as long-term advantages such as providing access to training and reduced defect variability²⁸.
- 2.29** Historically manufactured housing systems have been associated with lower design quality – i.e. post-war pre-fabricated homes – and this has affected perceptions of design quality of modern MMC systems and products. There has been significant progress with the design quality of contemporary MMC products and systems. Whilst achieving economies of scale relies on a significant degree of standardisation of product and output, there has been significant evolution in the variation and quality of MMC products and systems which can be created with an emphasis on delivering systems which can create relatively standardised interiors whilst still being able to deliver varied facades and streetscapes – for example using

²⁴ Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

²⁵ Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

²⁶ Written Evidence submitted by Buildoffsite for Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

²⁷ Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

²⁸ House of Lords. Science and Technical Select Committee. 2018. Off-site manufacture for construction: Building for change

external clad brick slip systems. Whilst MMC systems might not be appropriate for some environments and contexts – i.e. some conservation areas – and also acknowledging that the greater the degree of variation / unique design requirements the higher the cost, MMC systems can typically achieve the same design quality and external appearance as the majority of traditional construction methods and styles. sue

Digitisation

2.30 The MMC sector and the methods and techniques employed in an off-site manufacturing setting lend themselves to the increased use of digitisation tools allowing MMC projects to be delivered with more certainty and confidence. Digitisation can be used during the production process to achieve precise assembly. Digital technology and Building Information Management (BIM) allow single digital models to be integrated into a multifunctional tool that provides a source of all information including design, specification, procurement, construction/assembly, quality control and finishing, handover, letting/selling, residential occupation and management, depreciation, and replacement/recycling/renewal to multiple parties²⁹.

Sustainability

2.31 The built environment is a significant contributor to the UK's direct and indirect carbon emissions³⁰; estimates range between 30%³¹ and 40%³². Whilst there is significant variation within the MMC sector, there are a number of potentially significant environmental benefits which can be realised:

- **Lower energy inputs** - A report by Arup estimated that 67% less energy is required to produce a modular building compared to a similar traditionally constructed product³³.
- **Importance of supply chains** - as with traditional homes a large proportion of carbon emissions (80%) are created through the supply chain. Thus, highlighting the importance of sustainable supply chains.
- **Reduced transport emissions** - By having the capability to reduce the total number of deliveries to site by 90%, volumetric off-site construction can help to reduce the carbon footprint of buildings³⁴; this is level of reduction is dependent on the MMC category and materials used. For example, in Hackney, a development called Dalston Lane utilised cross

²⁹ Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

³⁰ Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

³¹ Committee on Climate Change. June 2017. Meeting Carbon Budgets: Closing the policy gap. Accessed [here](#)

³² Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

³³ WRAP. Waste reduced potential of Offsite Volumetric. Accessed [here](#)

³⁴ WRAP. Waste reduced potential of Offsite Volumetric. Accessed [here](#)

laminated timber (CLT) instead of concrete to make the largest load-bearing timber structure in the world ranging from five to ten storeys. By using CLT, the site received 589 fewer deliveries than what would be required for a concrete build³⁵.

- **Reduced embodied carbon** – Referring to the CLT example cited above, the embodied carbon of the building was 49% less than an equivalent concrete structured building³⁶. Moreover, it delivered a net carbon footprint of -2,600 tons CO₂ compared to +2,000 tons CO₂ (equivalent concrete construction) because of the development's capacity to achieve a high proportion of sequestered carbon³⁷. This is particularly important as frequently MMC products rely on timber-based materials compared with traditional concrete and steel frames which are more carbon intensive.
- **Higher environmental performance** - In 2018, only 1% of homes met the Energy Performance Certificate Band A³⁸. Homes delivered by MMC are estimated to have higher energy efficiency ratings and take 20% - 30% less energy to heat.³⁹. Embedding higher standards of energy efficiency into housing stock results in stock being able to adhere to future regulation changes. Inefficient homes are at risk of requiring costly retrofitting to comply with future regulations relating to energy performance requirements.
- **Reduced waste** - The design and manufacturing process of MMC enables manufacturers to ensure resources are most efficiently used by controlling the flow of materials and engaging with their supply chain⁴⁰. WRAP produced a case study that found that the integrated design, procurement, and management of volumetric construction can drastically reduce wastage generated on an equivalent traditional site by 90%⁴¹.

Safety

2.32 In 2020-21, the construction industry experienced the most deaths (39) of any industry in the UK, of which 50% were caused by falling from height⁴². While fatal injuries do occur in manufacturing, total fatalities are significantly lower than construction. Construction injuries are between 50% - 100% higher than manufacturing, despite employing roughly the same number of workers⁴³.

³⁵ RICS. September 2018. Modern Methods of Construction: A forward-thinking solution to the housing crisis?

³⁶ Ibid.

³⁷ Ibid.

³⁸ Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

³⁹ Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

⁴⁰ WRAP. Waste reduced potential of Offsite Volumetric. Accessed [here](#)

⁴¹ WRAP. Waste reduced potential of Offsite Volumetric. Accessed [here](#)

⁴² HIS Construction statistics in Great Britain.

⁴³ Improved health and safety – Construction injuries are between 50% - 100% higher than manufacturing and employ roughly the same number of workers.

<http://www.hse.gov.uk/statistics/pdf/fatalinjuries.pdf> and

<http://www.hse.gov.uk/statistics/industry/>

2.33 Generally, with the MMC sector safety risk is transferred from a construction site to a controlled manufacturing environment. It is, therefore, important that investment around factory techniques is safe and productive and eliminate manual working in a hazardous environment through automation and robotics as well as standardisation of components and processes.

Scale of delivery - additionality

2.34 It is important to note that MMC provides an opportunity to create genuine **additionality** in terms of housing supply. The relative undersupply of housing relative to identified need has been touched on above; MMC provides an outlet to generate genuinely additional supply in addition to traditional construction methodologies. For example, Berkeley Homes invested in the construction of 150,000 sq ft manufacturing factory in Northfleet, Kent to support the construction of 1,000 homes per year over and above their existing housing delivery targets (delivered principally via traditional methods of construction)⁴⁴.

Barriers to MMC

Key points

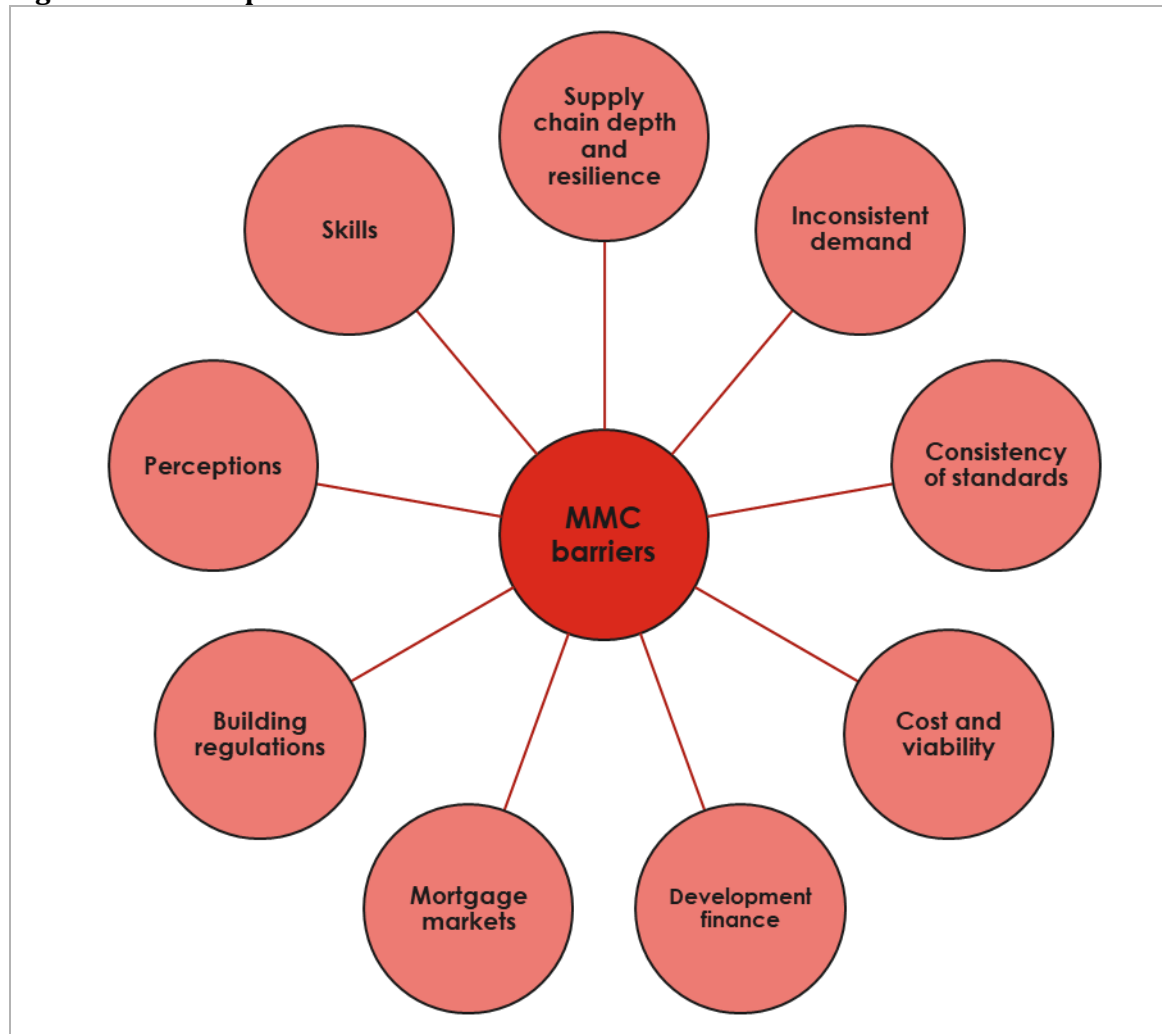
- There are a number barriers and challenges faced by the MMC sector to greater or lesser extents (depending on the category of production):
 - a) Lack of supply chain depth and resilience
 - b) Inconsistent demand to generate economies of scale
 - c) Consistency of standards not always achieved – teething issues expensive to remedy
 - d) Cost and viability – challenges with delivering economies of scale to bring down cost, particularly with relatively new supply chains and significant up front capital costs to establish manufacturing capacity
 - e) Development finance – a challenge to conventional development cashflow (i.e. much higher up front expenditure)
 - f) Mortgage finance – risk averse lenders, lack of information on MMC products and risks involved
 - g) Building regulations – not necessarily aligned yet with MMC technologies and processes
 - h) Perceptions – multiple stakeholders; potential of MMC not being fully realised – risk averse behaviour throughout the sector
 - i) Skills – overall construction sector skills challenges, MMC also calls for different skills needs (i.e. digital design, production line etc) which can be challenging to recruit for

⁴⁴ Berkeley Group. March 2018. Our Modular Homes Vision Revealed. Accessed [here](#)

2.35 Whilst the drivers and benefits of MMC have been articulated above, there remain a number of barriers to the growth of the sector – many of which are interlinked. As with the identification of drivers, the principal identified barriers have been identified at an overarching, sectoral level – there are various other barriers relevant to specific MMC categories and business models.

2.36 The principal barriers are identified in Figure 2-4 below.

Figure 2-4: Principal barriers to MMC



Source: SQW Analysis

Supply chain depth and resilience

2.37 Whilst the MMC sector is growing, supply chains across the various categories are at differing stages in terms of their respective maturity. This is driven by a number of factors, not least the nascency of technologies, methods and products, variable demand, inconsistent investment, fragmented procurement and the cyclical nature of housing delivery⁴⁵. A lack of

⁴⁵ RICS. September 2018. Modern Methods of Construction: A forward-thinking solution to the housing crisis?

breadth and depth in MMC supply chains puts upward pressures on costs and can lead to programme delays due to manufacturing lead-in times.

2.38 Where demand drivers for MMC products are strong, this can give confidence to manufacturers to produce and hold stock to offset the risk of variable demand and mitigate programme and cost risks. Resilient supply chains require efficiency and certainty which can be achieved through collaboration in procurement and investment⁴⁶, for instance through establishing procurement frameworks and making more visible forthcoming pipeline of demand to help manufacturers plan ahead.

Inconsistent demand

2.39 MMC techniques and products rely to a significant extent on manufacturing technologies. Typically manufacturing facilities rely on consistent demand to ensure that facilities can operate on a predictable basis. Without predictable and consistent levels of demand, the input costs of materials, infrastructure, utilities and labour can become disproportionate to the cost of the manufactured product due to the implications of mothballing an assembly line, standing down a labour force, disrupting supply chains etc.

2.40 One of the greatest challenges for the MMC sector is therefore securing a secure, predictable and consistent pipeline of projects. An over-supply of manufacturing capacity – and the associated significant cost implications for the business – which over-estimated pipeline development, was a key factor cited by Countryside in announcing the closure of its timber frame modular housing factoring at Bardon, Leicestershire in July 2022⁴⁷.

Consistency of standards (and scalability)

2.41 MMC comprises a wide range of products, methods and techniques ranging from fully off-site manufactured volumetric products through to panellised methods requiring on-site assembly. Many of these methods and techniques are in their relative nascency. There are additional challenges for contractors in learning the skills required to efficiently and precisely install off-site manufactured MMC systems, particularly in the context of the marginal tolerances acceptable in terms of the interface between the sub-structure (i.e. slab and foundations) and volumetric / panellised systems.

2.42 A lack of standardisation between different methods and techniques can increase the risks of errors, defects and installation issues, and therefore production delays, and client risk once they take responsibility for the building's operation and maintenance⁴⁸.

⁴⁶ Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

⁴⁷ Countryside to close brand new £20m modular factory, 22 July 2022 (Building.co.uk) Accessed [here](#)

⁴⁸ Tata Steel. April 2022. Blog: Improve resilience in MMC supply chains and driving adoption of DfMA. Accessed [here](#)

- 2.43** Standard design harmonisation (the use of repetitive components) can be viewed as an enabler for greater use of MMC and off-site manufacturing as the repeatable process can be automated, drive investment, increase productivity, embed quality leading to cost reductions⁴⁹. A relative lack of standardisation presents a risk that is recognised throughout the industry⁵⁰. There needs to be a significant advancement in industry standardisation to ensure that MMC products are scalable, profitable, and increasingly mortgageable⁵¹.
- 2.44** However, if defects creep into standardised products that are widely adopted throughout a factory, multiple factories or indeed across the industry, this could have serious implications on businesses and the wider industry. For example, production defects and inability to pass on additional costs of re-working of modular units was cited as a reason behind the Urban Splash's MMC Joint Venture with Sekisui House and Homes England, 'House, entering administration in July 2022⁵². Successful category 1 MMC requires maintaining factory output, any disruption cause by production or quality issues can have a serious effect on efficiency. As a result of the administration of House by Urban Splash, a total of £19m is owed to the supply chain⁵³. This points towards the need for quality assurance processes, effective supply chain management, and the accreditation of components and modules by to build trust and confidence in innovative construction.

Cost and viability

- 2.45** There are two principal components to consider here which are related factors: the **cost of construction**, and the associated **cashflow of payments**.
- 2.46** Whilst theoretically a manufacturing-led approach to development could result in cost reductions enabled through a repetitive, efficient manufacturing process, reduced construction programme and associated development financing period etc (see 'drivers' covered above), these cost efficiencies have been challenging to realise in practice, not least due to the relative infancy of the sector.
- 2.47** Costs of production are driven by many of the factors identified above. If the assumption is made that the costs of production via MMC are equivalent or less than via traditional methods then a further key dimension of financial viability in a development context comprises the cashflow of when these costs are incurred in the development process.

⁴⁹ House of Lords. Science and Technical Select Committee. 2018. Off-site manufacture for construction: Building for change

⁵⁰ House of Lords. Science and Technical Select Committee. 2018. Off-site manufacture for construction: Building for change

⁵¹ Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

⁵² Architects Journal. July 2022. News: House by Urban Splash's factory problems laid bare. Accessed [here](#)

⁵³ Architects Journal. July 2022. News: Architects among firms owed £19 million by House by Urban Splash Accessed [here](#)

2.48 Typically, construction costs for a traditional build are incurred sequentially throughout the process, as and when works are undertaken and materials and resources are required. In an MMC context, the cost and resources required at detailed design stage are frontloaded in the process ahead of manufacture. The combination of design fees within a pre-contract services agreement (PCSA) fees and an advanced payment required to secure factory time and space (and the resources, materials and inputs required to facilitate manufacture), result in a payment profile which contrasts significantly with a traditional build payment profile. SQW's experience of a range of MMC methods and techniques indicates that approximately 40-50% of total construction costs are required to be paid ahead of products / modules actually being delivered to site. With significant funding therefore required ahead of manufacture there is clearly a significant risk to the developer should disruption occur during the manufacturing or delivery process – notwithstanding that notionally this period should be shorter than for a traditional build.

Financing

2.49 The specific payment profile associated with MMC methods and products, not to mention the novelty of new products, materials and methods, requires a different legal contracting approach compared with traditional construction which requires distinct consideration of risks and security from a lender's perspective (providers of development finance), particularly recognising that lenders are typically risk averse.

2.50 For instance, the frontloaded payment profile of typical MMC factory-based products and processes requires payment protection and guarantees available to developers and their finance providers to provide surety that client's money is safe during the manufacturing process. This is required to create greater confidence and credibility for commercial lenders. An example of a payment protection includes advanced payment guarantees (APG) which holds the advanced payments within a secure deposit which provides greater security to developers and housebuilders purchasing components or modules from manufacturers. The added complexity and transaction cost (legal and financial) of the advance payment guarantee is an expensive and partial resolution to the risk management process. SQW is aware that Homes England view that this as a common problem are looking at roles the agency can play to provide greater confidence to lenders to fund MMC projects. Nevertheless, the high upfront capital costs and inaccessibility of development finance is constraining demand and volumetric manufacturing output more generally.

Mortgageability

2.51 Mortgage lenders are typically risk averse when it comes to lending against new or innovative products or technologies, and homes built by MMC are no exception. Whilst lender attitudes towards MMC products are evolving, and there are far more lending options for purchasers considering the acquisition of volumetric / modular homes, lender attitudes have to an extent been shaped by previous experiences of pre-fabricated and modular systems built homes – both pre-war and post-war – which relied on technologies and materials many of which were

innovative at the time and which have subsequently been identified as defective. Concerns from mortgage lenders have tended to focus on quality, lifespan and maintenance implications of MMC products with implications for valuation, assurance, warranties and insurance⁵⁴.

2.52 Accreditation schemes have been developed, including the Build Offsite Property Assurance Scheme (BOPAS) which provides assurance of the quality and durability of MMC homes to the extent that they will last at least 60 years, however a weakness of BOPAS is that it does not have the financial backing of a warranty scheme that would pick up the costs if there were issues with defects⁵⁵. Until relatively recently, the UK's largest warranty providers – NHBC, BLP, Premier Guarantee and LABC Warranty – each had different criteria and approaches to assessing MMC products, which made it challenging for lenders to understand the differences. Relatively few Importantly, these four warranty providers agreed a memorandum of understanding around assessing the reliability and durability of off-site homes which will entail information sharing, collaboration and transparency to drive a unified quality and standards-led approach⁵⁶.

2.53 Work to standardise approach to warranty provision is being undertaken through a raft of other initiatives to build consensus around industry standards, information requirements and valuation, including:

- i) JLL and Savills have collaborated to develop and launch the MMC Information Standard (a list of valuer's requirements) which will allow valuers to issue reliable, consistent valuations for funders⁵⁷.
- ii) The RICS is incorporating the Homes England definition of MMC into its supporting guidance for its new Home Survey Standard, New Build Valuation Guidance and the next revision of the International Construction Measurement Standard⁵⁸.

2.54 Significant strides are being made across the industry to build the confidence of lenders to provide mortgages for MMC products.

2.55 Building confidence of lenders in MMC products is not just about lending to individual purchasers, a key implication is of the ability to securitise debt secured against MMC homes. This applies to mortgage debt secured against privately owned homes, and portfolio debt held by Registered Providers secured against their own rental stock. There is increasing evidence

⁵⁴ Funding barriers to offsite housing, Trowers and Hamlin, 2019

⁵⁵ Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

⁵⁶ Warranty firms agree to develop standard MMC test, 8th October 2020, Offsitehub.co.uk Accessed [here](#)

⁵⁷ Legal Update: Modern Methods of Construction, 9 February 2021, Local Authority Building & Maintenance, Accessed [Here](#)

⁵⁸ Modern Methods of Construction working group: developing a definition framework, Homes England, 29 March 2019, Accessed [Here](#)

that funders have been willing to securitise debt held against portfolios of MMC built homes⁵⁹ with The Housing Finance Corporation (a funder with a total loan book to Registered Providers of over £7bn) now accepting MMC homes as loan security. This is particularly important for larger Registered Providers given that Homes England has made it a requirement of Strategic Partnerships under the 2021-26 Affordable Homes Programme that 25% of new homes are delivered using MMC. Securing funding against existing stock is a key funding source for Registered Providers, so aligning Homes England requirements for new build MMC affordable homes with the expectations and requirements of funders is of importance to this sector.

- 2.56** Fundamentally, issues of funding and finance linked to MMC are predicated on the ability to demonstrate quality, longevity and consistency of MMC products which requires transparency, data sharing and consistency in application of standards across valuation, assurance and warranties.

Building regulations

- 2.57** Building Regulations, and associated guidance contained in the Approved Documents, do not currently include any specific guidance regarding MMC products or technologies, recognising that MMC as a sub-sector is essentially a ‘system of systems’ for which bespoke assurance of design and installed performance is difficult. Therefore, there is a level of interpretation required when considering building regulations for MMC. The regulatory systems in which MMC are approved do not necessarily have mechanisms to address such technical complexities, or they ‘expect’ that they are handled in an extra regulatory manner (e.g., the responsibility of the building owner to employ ‘competent’ persons)⁶⁰.
- 2.58** Large volume housebuilders such as Barratt Developments and Taylor Wimpey have called for building regulations to be updated to reflect MMC for building homes and facilitate compliance⁶¹.
- 2.59** This being said, recent updates (2022) to Building Regulations and the Approved Documents, including Part F (Ventilation) and Part L (Conservation of fuel and power) and the release of a new Approved Document for Overheating (Part O), and the government’s planned Future Homes Standard which will require all new homes built from 2025 to produce 75-80% less carbon emissions than homes delivered in 2021, are all significantly pushing the sector towards delivering significantly improved environmental performance. MMC is arguably well positioned in this context to achieve these standards for reasons outlined above.

⁵⁹ How housing providers can use MMC homes for loan security, Inside Housing, 15 September 2020, Accessed [Here](#)

⁶⁰ Meacham, B. J. (2022). Fire performance and regulatory considerations with modern methods of construction. *Buildings and Cities*, 3(1), 464–487. Accessed here

⁶¹ Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

Perceptions

- 2.60** Negative and/or risk averse perceptions of MMC influence a number of the barriers identified, including lender attitudes, but also influencing consumer attitudes towards MMC homes.
- 2.61** Lack of consumer appetite for MMC has often been cited as a barrier to the sector⁶² that off-site construction and modular homes result in poorer quality products can be associated with the post-war ‘pre-fab’ housing and their design flaws⁶³. Embedded customer behaviours are thought to have some influence on the desirability of MMC products⁶⁴.
- 2.62** This being said, there are very few examples of MMC built homes – particularly volumetric building systems – so there the market is particularly under-developed and not ‘proven’. To a significant extent there is a need for homes to be delivered to demonstrate the quality of the product to attract consumers rather than waiting for consumer market signals to drive the market in the first instance.
- 2.63** The industry environment is also characterised by a ‘survival’ structure of low investment, high demand cyclical and non-aligned interests that reinforce traditional procurement routes have resulted in a lack of incentives for large-scale industry transformation⁶⁵. Therefore, short-term industry thinking on low construction costs has inhibited long-term gains. Cultural resistance from the construction industry to move away from current business models and adopt innovative processes has also acted as a barrier to MMC adoption⁶⁶.

Skills

- 2.64** With a smaller construction workforce post-Brexit and a longstanding traditional skills shortage, there is a clear need for a well-trained workforce to enable the delivery homes at pace to meet the Government’s housing delivery targets. Evidence points towards the need for both traditional construction and MMC skills in the future⁶⁷.
- 2.65** The CITB has identified key job roles relating to MMC. Whilst some of these roles are distinct from the on-site, trades-based skillsets typically required by traditional construction methods, for many MMC systems these ‘core’ trade skills will still be required, albeit in new contexts.

⁶² Made for London: Realising the potential of modern methods of construction, Victoria Pinoncely & Erica Belcher, 20 September 2018 Accessed [Here](#)

⁶³ CITB. 2017. Faster, Smarter, More Efficient: Building Skills for Offsite Construction

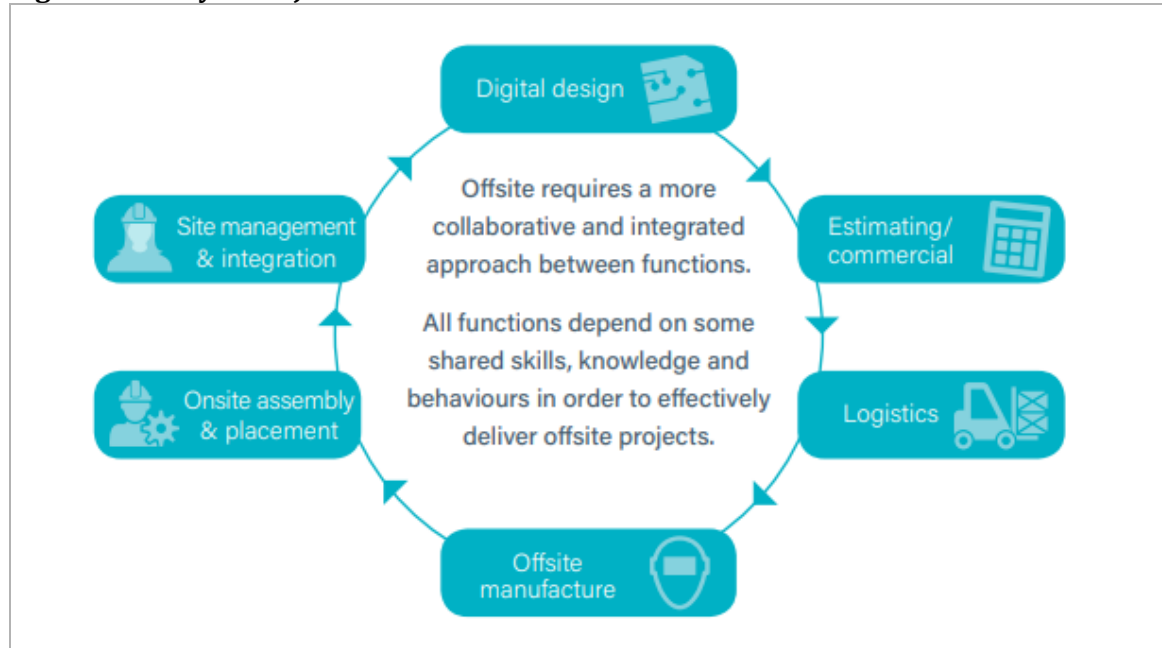
⁶⁴ Housing, Communities and Local Government Committee. June 2019. Modern Methods of Construction.

⁶⁵ Farmer. 2016. Modernise or die: The Farmer review of the UK Construction Labour Model

⁶⁶ Farmer. 2016. Modernise or die: The Farmer review of the UK Construction Labour Model

⁶⁷ CITB. April 2019. The Impact of MMC on skills requirements for housing: A report on the skills implications for both panelised and volumetric housing construction.

Figure 2-5: Key MMC job functions



Source: CITB, 2019

- 2.66** Digital design includes BIM technicians, architects, and design engineers; digital skills and knowledge (3D digital modelling and BIM) are crucial part of this job function to ensure that designs are robustly tested and agreed before manufacturing process begins to avoid errors and modifications that can affect costs and production efficiencies. Digital design, BIM and MMC skills and knowledge should be embedded in further and higher education. However, shortage of tutors with relevant knowledge and experience has been cited as a major barrier to delivering appropriate training and developing these skills⁶⁸.
- 2.67** 'Estimating/commercial' is required by traditional construction methods, for many MMC systems these 'core' trade skills will still be required, albeit in new contexts.
- 2.68** Figure 2-5 relates to roles relating to the management and forecasting of costs such as a quantity surveyor, estimators, and commercial managers. These roles require technical skills relating to estimating whole-life cycle costs, analysing tenders, BIM, contract law, quality assurance and MMC design and material knowledge. CITB's research identified a shortage of estimators with MMC-related skills as there is no formal CPD training route and again, a lack of tutor supply⁶⁹.
- 2.69** Logistics roles include signaller, despatch leader, logistic/plant manager which are relatively similar to onsite roles, however, greater control and precision is required when working off-site⁷⁰. A training and skill gap identified was the mixture of existing methods and new

⁶⁸ CITB. April 2019. The Impact of MMC on skills requirements for housing: A report on the skills implications for both panelised and volumetric housing construction.

⁶⁹ CITB. 2017. Faster, Smarter, More Efficient: Building Skills for Offsite Construction

⁷⁰ CITB. 2017. Faster, Smarter, More Efficient: Building Skills for Offsite Construction

knowledge that covers off-site processes and materials⁷¹. Thus, limiting people's ability to develop transferrable skills and knowledge in both areas.

- 2.70** Off-site manufacturing roles include multi-skilled trades, welding, fabricator, machinist, project manager, and factory manager. Traditional trades lay the foundations of knowledge which makes these jobs easier to fill. However, there is a need for investment in human capital to upskill traditional trade skills such as joiners, carpenters, and plumbers in an MMC setting⁷². Upskilling 'tradespeople' gives them the knowledge to complete quality assurance tasks. Upskilling is usually done through company in-house training⁷³. Anecdotally, one volumetric MMC manufacturer in the south-east of England has indicated that in recruiting for factory positions they are seeking potential recruits with transferable skills with assembly line or tool making / maintenance experience (i.e. automotive sector) rather than necessarily seeking those with construction sector experience.
- 2.71** Onsite placement and assembly roles include groundworks, crane operators, assembly technicians and site managers. These roles rely on traditional trade skills with additional technical and soft skills such as working to stricter accuracy. People can transfer to these roles from traditional onsite operatives. Site and property managers need to be able to integrate onsite and offsite solutions in one project. Therefore, having a generic skillset in construction with the added skills and knowledge in products, materials and digital software. It is expected that these roles will evolve to require a highly skilled and knowledgeable programme/project manager has the capabilities to oversee everything from design to completion.
- 2.72** A 2021 Skills and Training Survey conducted by the Construction Industry Training Board (CITB) surveyed over 1000 organisations involved in the construction sector and found that only 15% of businesses with direct employees identified MMC as a driver of new skills or knowledge in their businesses, compared, for example, to new legislative requirements (34%) or increased competitive pressure (36%)⁷⁴.

MMC and flood risk

- 2.73** One of the major challenges to MMC products and techniques is dealing with the risks of water ingress – a particularly acute risk in areas prone to flood risk – acknowledged as a particular challenge in the context of this study in East and South Lincolnshire. This is particularly the case for MMC techniques and methods that rely on volumetric or panellised systems comprising significant use of timber-based products.
- 2.74** A key dimension of BOPAS (introduced earlier in this Report), the principal off-site manufacturing accreditation, relates to water ingress. Significant focus is given to the interface between the manufacturing, storage, transport, installation, completion and occupation stages where, regardless of the approach (i.e. 3D or 2D modular systems) there

⁷¹ CITB. 2017. Faster, Smarter, More Efficient: Building Skills for Offsite Construction

⁷² Off Site. Refining MMC by David Robins from Places for People. Issue 31 pg. 40.

⁷³ CITB. 2017. Faster, Smarter, More Efficient: Building Skills for Offsite Construction

⁷⁴ Research report: Skills and training in the construction industry 2021, CITB, February 2022

are significant opportunities for water ingress. The BOPAS accreditation process for MMC manufacturers requires Failure Mode and Effects Analysis (FMEA) at both the design and process stages – essentially the use of analytical methods to reduce the risk of product failure.

2.75 The insurance industry is putting significant efforts into understanding the risks posed by new MMC technologies, with focus both on fire risk / combustibility and water ingress – both of which have been identified by the insurers as significant concerns⁷⁵. A recent White Paper (January 2022) prepared by RISC Authority, a research scheme administered by the Fire Protection Association and supported by UK insurers (including AXA, Allianz, Zurich, SwissRe etc) reported on the findings of the Massive Timber Working Group which was formed to specifically respond to the insurance challenges of newer building methods including significant amounts of timber. The report highlights that water exposure (from flood, weather ingress, failure of water bearing systems, fire fighting or pooling) is the greatest category of insurance loss in the domestic and residential sector – greater than fire and security combined⁷⁶. The industry has concerns that increased use of timber materials in this context.

2.76 The White Paper set out a number of recommendations and ‘essential principles’ regarding the construction of massive timber buildings to mitigate risk in regard to flooding and water ingress. The paper included recommendations such as ‘*do not build on floodplains*’ and ‘*raise building and plant above maximum likely immersion depth*’. Risk factors identified for timber structures and water ingress included the risks posed by cavities/voids between pods / panels and the use of green and blue roofs/surfaces⁷⁷. Additional recommendations included building the ground floor with concrete to improve resilience to flooding, using CLT panel waterproofing membranes to reduce the risk of water ingress during delivery and construction prior to water proofing, and locating bathrooms and kitchens (for apartment buildings) in concrete cores to reduce the potential for escape of water damage⁷⁸. Some of these recommendations are comparable to requirements often imposed by planning policy, but provide more specific guidance regarding safeguarding the resilience of timber-built products during the manufacture and installation process (which goes beyond the remit of planning policy).

2.77 It is evident that MMC products and technologies raise potential issues for construction in, for example, locations with a high flood risk given the tendency for MMC Category 1 and 2 systems tend to utilise lightweight, sustainable materials including timber.

⁷⁵ 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

⁷⁶ Insurance challenges of massive timber construction and a possible way forward (Revision 1.0, January 2022), RISC Authority

⁷⁷ Insurance challenges of massive timber construction and a possible way forward (Revision 1.0, January 2022), RISC Authority

⁷⁸ Insurance challenges of massive timber construction and a possible way forward (Revision 1.0, January 2022), RISC Authority

2.78 Whilst use of Category 1 and 2 MMC technologies is still relatively in its infancy across the UK, some emerging evidence shows that where MMC products and process are utilised in flood plain locations, that they still require standard flood risk mitigations including the use of raised platforms and concrete at ground floor level. An example of a Category 1 modular project in a high flood-risk area is provided in the case study below.

Case Study 1 – Ashford Borough Council – proposed modular housing in a flood plain location

Ashford Borough Council is partnering with ZedPods, a manufacturer of factory-produced modular units, to provide 23 zero-carbon, modular (BOPAS accredited) homes on an existing car park site. The homes will provide temporary accommodation for homeless individuals. ZedPods are providing a full turnkey solution – design, planning, manufactured and installation.

Over the life of the project the Council estimates the project will save them £5.284m of costs which would need to have been taken out of the Council’s General Fund to cover the temporary accommodation costs for homeless people, and is estimated to generate an Internal Rate of Return of 6.60%.

The site is located in an area at risk of flooding – Flood Zone 3 – so to mitigate this risk the modular accommodation will sit above a 2.4m high platform (ground floor will comprise storage only).



Source: Zedpods.com, Accessed [Here](#)

An overview of the MMC sector in the UK

Key points

- There are a relatively small number of full turnkey, modular volumetric manufacturer/developers – those which exist have typically benefitted from significant government investment and are often loss-making, but are acting as pioneers. The number is also growing.
- There are a number of manufacturers which provide 2D or 3D systems which can then be utilised by housebuilders / developers / contractors – there is a significant diversity in the available systems and technologies.
- Major housebuilders and developers are increasingly investing in their own MMC factory capacity ranging from volumetric to panellised methods – many of the early-movers and investors in this space have acknowledged they are making significant losses (and there have been high-profile failures), but the numbers are growing and there is, overall, evidence of increasing capacity, investment in R&D and a growing pipeline notwithstanding the still challenging economics of the model in the context of wider macro-economic challenges.

2.79 The MMC sector and its broad constituent categories have been defined above, this section focuses on the current MMC landscape in the UK: the alternative business models, supply chain characteristics, key organisations / manufacturers and current trends in the sector.

2.80 There are broadly three principal business models which capture organisations engaged in MMC:

Volumetric manufacturers (full turnkey)

2.81 Examples here include **ilke Homes**, **Impact Modular** and **TopHat** which both offer full turnkey services as well as being able to act as supplier, lead developer or work in partnership with other developers and housing providers. A case study is provided below for ilke Homes.

2.82 Ownership and investment in these businesses varies: Impact Modular for instance is financed by equity invested by UK family offices and financial institutions; ilke Homes is backed by majority shareholder TDR Capital, debt issued via Homes England's Home Building Fund (and who have backed ilke Homes through multiple investment stages) and a mix of minority shareholders (including Middleton Enterprises, Sun Capital, the Guinness Partnership and Places for People); TopHat is backed by investment from Goldman Sachs.

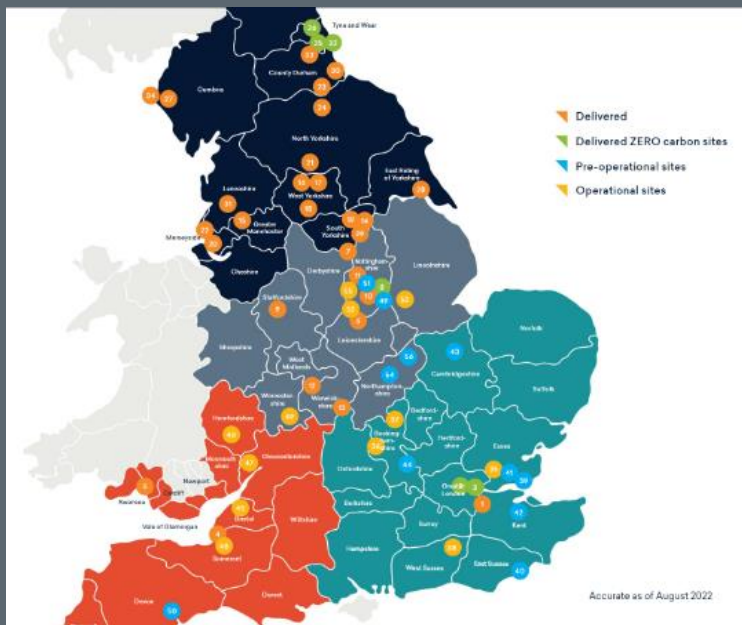
Case Study 2 – ilke Homes

ilke Homes is a leading manufacturer of volumetric homes. Their volumetric product is built with galvanised steel frames and timber trusses and are delivered to site fully finished, inside and out. Their homes can be clad in a number of different styles – brick, render, cladding boards – as appropriate. Their portfolio of home designs includes significant variation (size, layouts and finishes) and can be applied to a range of affordable and market tenures.

Their standard homes perform 15-20% better than current (May 2022) Building Regulations, have significantly lower embodied carbon and lower utility costs than conventional homes, and can also deliver zero carbon homes.

ilke homes are covered by the standard 10-year NHBC Buildmark warranty, as well as accreditation by BOPAS and process and quality reviews by Lloyds Register and BLP.

Their factory in Knaresborough, North Yorkshire, utilises robotics technologies and can complete up to 8 homes each day across 6 different production lines with a production capacity of c. 2,000 homes per year. Their homes can be ready to occupy within 3 weeks, with a 12-week call-off period. Up to 6 homes per crane, per day can be installed. They install, test and commission all homes on-site and, as shown in the map below, they have and are delivering homes across England – including a scheme in Grantham, Lincolnshire, contracting on behalf of Man Group for a 227 home scheme.



ilke Homes have launched an academy on-site adjacent to their Knaresborough factory where they are teaching skills including engineering, plumbing, manufacturing, carpentry and design. This academy both trains new recruits and existing employees, and supplements an existing leadership course, apprenticeship and graduate scheme pathways.

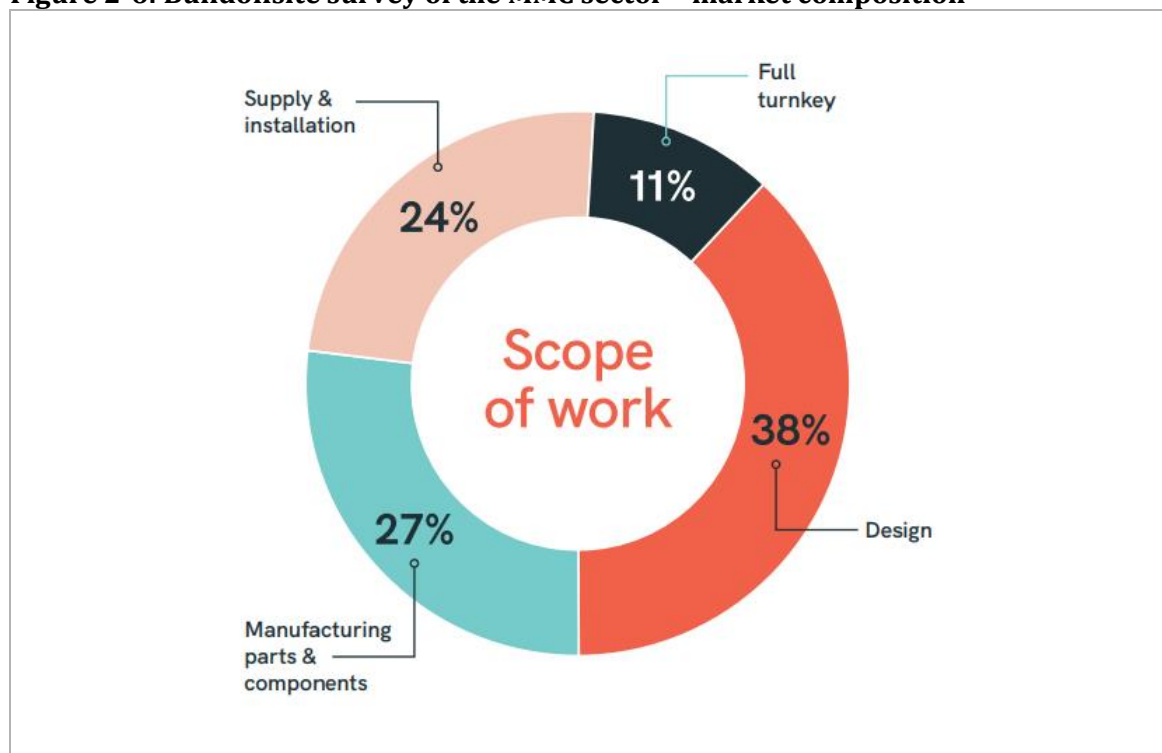
ilke Homes have also set up networks with local prisons to support training, skills and employment pathways to prevent re-offending.

Source: ilkehomes.io; An introduction to ilke Homes 2022 (accessed [Here](#)); ilke Homes launches UK's first modular housing academy (pbc today, 17 September 2019, Accessed [Here](#))

Specialist MMC supply chain manufacturers (Homes England MMC Definition Categories 2-5) and service provision

- 2.83** It is challenging to estimate the precise size or composition of the MMC sector as, many existing construction firms and their supply chains are likely engaging both in traditional construction projects as well as developing, applying and adopting MMC technologies and products, in addition to specialist MMC firms.
- 2.84** A survey undertaken by Buildoffsite in 2021 provides a snapshot of firms engaged in MMC which identified relatively few of their members provide full turnkey solutions, and instead many respondents were either engaged in supply, installation, design or manufacture of parts/components, as detailed below in Figure 2-6 below.

Figure 2-6: Buildoffsite survey of the MMC sector – market composition



Source: Buildoffsite – Challenges and barriers to adoption of offsite and MMC (2021 – Accessed [Here](#))

- 2.85** Firms falling into this broad ‘supply chain and services’ category include those firms which fall within Homes England’s definitions of Categories 2-5 (2D primary structural systems; pre-manufactured structural components; additive manufacturing; pre-manufacturing of non-structural components).
- 2.86** Examples of Category 2 manufacturers include:
- **LoCaL Homes** – a not-for-profit manufacturer (part of the GreenSquareAccord Group housing association) which manufactures both open and closed panel timber frame systems
 - **Project Etopia** – a manufacturer of highly-sustainable, low cost panellised systems.

- **Roe Timberframe** – focused on designing, manufacturing and erecting open panel timber frame systems.

2.87 Examples of Category 3 (pre-manufactured structural components) manufacturers include:

- **FP McCann** (UK-wide – including Ely, Cambridgeshire)– a UK-wide supplier of precast concrete products including a range of architectural and structural products).
- **Thorp Precast (Staffordshire)** – manufacturer of structural concrete components (also capable of supplying Cat 2 unitised facades and Cat 5 non-structural façade components).

2.88 Examples of Category 5 (non-structural components) manufacturers include:

- **Walker Modular (Humberside)** – manufacturer of bathroom bods.
- **Taplanes (Harrogate)** – manufacturer of bathroom and shower pods.

Existing housebuilders / developers / housing associations investing directly in MMC capacity

2.89 A number of the housebuilders, developers and housing associations across the UK have invested in MMC manufacturing and supply chain capacity, with a number of examples provided below:

- **Berkeley Group (Berkeley Offsite Modular Ltd)** Berkeley has invested in an advanced manufacturing facility in Northfleet, Kent (opened 2020), to provide a volumetric modular housing solution specifically for the Berkeley Group. The approach they are developing, using automated production technologies from the aerospace and automotive sectors, is predicated on standardised ‘core’ structural and component parts within modules which can be utilised for both housing and apartments⁷⁹. The existing factory opened for production in the summer of 2021 and is capable of delivering 1,000 homes per year. A further factory is planned nearby in Medway which will also be capable of manufacturing 1,000 homes per year⁸⁰.
- **Countryside** – Countryside Partnerships had invested heavily in its MMC manufacturing capacity in recent years, and owns three modular factories across the UK. It had invested £20m in a closed panel timber frame manufacturing facility at Bardon, Leicestershire which opened in 2021 with the intention of delivering over 3,000 homes per year. Following a review of the Group’s manufacturing facilities Countryside opted to close the factory in 2022 and put it up for sale⁸¹.

⁷⁹ Berkeleygroup.co.uk, Accessed [Here](#)

⁸⁰ House factory on Hoo Peninsula could produce 1,000 homes a year and create 250 jobs, 23 June 2022, KentOnline Accessed [Here](#)

⁸¹ Developer closes MMC factory after review of manufacturing facilities, 25 July 2022, Inside Housing, Accessed [Here](#)

- **Legal and General** – L&G was an early investor in MMC, launching its modular business in 2016. It has invested in a 550,000 sq ft factory in Sherburn-in-Elmet, Yorkshire together with an on-site training academy. L&G has invested significant funds since the creation of its modular subsidiary and posted pre-tax losses of £30.6m in 2019, and £30.2m in 2020⁸², following significant closes in previous years. L&G has aspirations to be delivering 3,000 modular homes a year by 2024, although its pipeline is currently significantly below this level. Their product types include 2-bed houses, 3-bed houses and apartments (1-bed; 2-bd) all of which exceed national space standards and achieve EPC A-rating⁸³.
- **Hill Group** – Hill Group acquired Fusion Steel Framing Ltd in 2022, including its 80,000 sq ft manufacturing facility in Northampton, to build its capacity for the design, manufacture and installation of light steel frame technology for apartments, student accommodation. The manufacturing facility provides capacity in the manufacture of capital-intensive roll-forming and assembly of light steel frames using lean manufacturing processes, as well as having the capability of providing structural kits for volumetric modules, bathroom/shower pods and prefabricated utility cupboards⁸⁴.
- **Swan Housing** – Swan Housing invested in a 75,000 sq ft factory in 2017 in Basildon, Essex, to manufacture Cross Laminated Timber (CLT) volumetric homes. The factory had the capacity to manufacture up to 400 homes per year. Swan announced, in 2020, investment, supported by UK Government funding (Getting Building Fund) in a second 116,841 sq ft factory (adjacent to the first) capable of manufacturing an additional 600 homes per year. The new factory will be focused on manufacturing of light-gauge steel modular housing. One of the drivers behind Swan's investment in its MMC capabilities is the requirement of affordable housing funding programmes (both Homes England and the GLA) for a significant proportion of homes to be delivered using MMC⁸⁵.

2.90 What is clear even from this high-level snapshot of the UK MMC sector is that many of the pioneer, large-scale investors in MMC manufacturing capacity (particularly volumetric manufacturers) are making significant losses – even some of those with public sector backing. This is not unexpected, to an extent, given the relative nascency of the sector, the significant capital expenditure and investment in resourcing and workforce required to enter and support the establishing of a new market sector together with the innovation that this entails. The risks and costs are significant, but these are being absorbed by some of the early backers of MMC in the context of the perceived long-term opportunity presented by MMC.

2.91 This being said, the direction of travel across the industry is clearly that housebuilders, developers and housing associations are investing significantly in expanding their MMC capacity and capabilities.

⁸² L&G's modular business posts further £0m loss, 13 September 2021, Inside Housing, Accessed [Here](#)

⁸³ Legalandgeneral.com, Accessed [Here](#)

⁸⁴ Hill.co.uk, Accessed [Here](#)

⁸⁵ Offsitehub.co.uk, Accessed [Here](#)

Sector review – key conclusions

2.92 The key 'takeaway' conclusions from this review of the sector are detailed below.

ector review – key conclusions

Strategic context:

- The construction sector is facing a growing workforce and skills shortage
- Significant pressures on construction cost inflation and supply chain volatility – look set to continue
- National housing shortage – consistent national-scale failure to deliver the required supply
- Growing importance of ESG factors on decision-making for investors, developers and construction companies

Policy context:

- The Government is consistently placing emphasis on increasing the UK economy's productivity – the construction sector is included here, with a key role for MMC
- Significant emphasis and guidance issued by the Government to public sector bodies to use their levers to drive increased construction productivity through supporting and facilitating MMC
- Homes England, using its various funding and policy levers, is prioritising MMC using a number of different mechanisms (direct investment, funding criteria etc)
- Homes England has driven efforts to standardise definitions and categorising of the MMC sector and its constituent categories / technologies – overall it is placing a strong focus on volumetric and panellised technologies and processes which have a high 'pre manufactured value' (PMV), known as Category 1 and Category 2 technologies

Key MMC sector drivers:

- Productivity – cost and programme
- Quality – standardisation etc
- Additionality – adding to existing supply and attracting new investment
- Safety – factory conditions vs on-site risks
- Sustainability – less waste, greater use of timber, lower carbon etc
- Digitisation – use of integrated design, manufacture and operational systems to increase efficiency

Key MMC sector barriers and challenges:

- Lack of supply chain depth and resilience
- Inconsistent demand to generate economies of scale
- Consistency of standards not always achieved – teething issues expensive to remedy
- Cost and viability – challenges with delivering economies of scale to bring down cost, particularly with relatively new supply chains and significant up front capital costs to establish manufacturing capacity

- Development finance – a challenge to conventional development cashflow (i.e. much higher up front expenditure)
- Mortgage finance – risk averse lenders, lack of information on MMC products and risks involved
- Building regulations – not necessarily aligned yet with MMC technologies and processes
- Perceptions – multiple stakeholders; potential of MMC not being fully realised – risk averse behaviour throughout the sector
- Skills – overall construction sector skills challenges, MMC also calls for different skills needs (i.e. digital design, production line etc) which can be challenging to recruit for

Overview of the UK MMC sector:

- There are a relatively small number of full turnkey, modular volumetric manufacturers – those which exist have typically benefitted from significant government investment and are often loss-making, but are acting as pioneers. The number is also growing.
- Major housebuilders and developers are increasingly investing in their own MMC factory capacity ranging from volumetric to panellised methods – many of the early-movers and investors in this space have acknowledged they are making significant losses (and there have been high-profile failures), but the numbers are growing and there is, overall, evidence of increasing capacity, investment in R&D and a growing pipeline notwithstanding the still challenging economics of the model in the context of wider macro-economic challenges.
- Significant diversity in manufacturing systems and technologies – some are capital intensive (particularly those which are reliant on assembly line / robotics technologies – Berkeley Homes) whereas others are less capital intensive and are typically more reliant on using more traditional trades / skills in a controlled factory setting (e.g. Beattie Passive).

3. MMC: Supply-side factors in a Greater Lincolnshire context

Introduction

- 3.1** This section of the report provides an overview of the supply-side context and dynamics relevant to construction and the MMC sector in a Greater Lincolnshire context, covering the following:
- **Greater Lincolnshire economic context** – regional sectoral priorities and themes, including key opportunity and growth areas and potential relevance to MMC.
 - **Skills and education** – a high-level review of the skills and education landscape across Greater Lincolnshire, including identification of the specific labour demand and supply dynamics, strengths and challenges specific to construction and MMC.
 - **Construction sector overview** – a focused review of the size and nature of the existing construction sector in Greater Lincolnshire, principally at the level of consideration as an economic sector, and also including a review of high-growth construction firms.
 - **The existing MMC manufacturing landscape in Greater Lincolnshire** – identification of existing MMC manufacturers / suppliers in Greater Lincolnshire and within a 60-mile radius of the county, with a focus on the residential sector.
- 3.2** This section does not focus on the demand-side aspects of MMC – i.e. housing demand and delivery and the organisations delivering new homes and the extent to which they are engaging with MMC. This follows in Section 4.

Greater Lincolnshire economic context

Key points

- Construction is not recognised as a major or priority sector or employer in Greater Lincolnshire
- Key sectoral priorities include agri-food, energy and ports and logistics
- Much of Greater Lincolnshire is rural, with key urban locations including Grimsby, Scunthorpe, Lincoln, Sleaford and Boston
- Manufacturing clusters are particularly prevalent in the north of the county
- There is potential for transferable skills linking manufacturing and logistics sectors to MMC – however, these transferable skills might relate to one dimension of MMC (i.e. assembly line, logistics etc) and the rounded skills package and requirements of specific MMC systems would always need to be considered in context
- Significant investment and growth opportunities are apparent around the newly designated Humber Freeport as well as potential alignment with investment and growth focused around the Port of Boston

- 3.3** This section provides a high-level overview of the strategic economic and policy context at a regional level, focusing on the Greater Lincolnshire Local Enterprise Partnership (GLLEP) geography. This is not a comprehensive review but, instead, focuses on areas of particular relevance to construction and MMC.
- 3.4** GLLEP is one of the largest LEP areas in the country; total economic output in 2020 (noting that this was impacted by Covid) was £23.3bn⁸⁶. It is a largely rural area with the three largest urban settlements being Grimsby, Lincoln and Scunthorpe. There are pronounced pockets of deprivation, particularly to the east of the county which is relatively poorly connected and underserved by major infrastructure and employment opportunities. This results in socio-economic disparities between disconnected areas and better-connected parts of Greater Lincolnshire⁸⁷. The Local Industrial Strategy (LIS) aims to maximise opportunities for all places and sectors. The priorities in the LIS aim to recognise and reflect Greater Lincolnshire's unique and dispersed places and capitalise on their distinctive qualities.
- 3.5** The following section provides an overview of GLLEP's priority sectors focussing on ambitions, challenges, and where appropriate pointing to interactions with the MMC sector.

⁸⁶ Midlands Engine Observatory, Intelligence Briefing: Gross Value Added (GVA), May 2022, Accessed [Here](#)

⁸⁷ Local Industrial Strategy Evidence Base. 2019. Greater Lincolnshire LEP.

Agri-food

- 3.6** The agri-food sector represents a large proportion of the local economy by GVA (18%) and employment (24%) in Greater Lincolnshire, also representing 12% of England's total agricultural production⁸⁸. The sector comprises of large international and national food producers and the highest concentration of food logistics in the UK. The A46, A15, A16 and A17 play strategic roles in the transfer of goods with growing clusters of food logistics on the A1. Additionally, ports are key to this sector as only 55% of UK food demand is met from the UK.
- 3.7** Food and agriculture is of strategic importance to Greater Lincolnshire. It is identified as a priority sector by GLLEP and significant investments have been made, and are planned, in higher-education (i.e. the Centre of Excellence for the Agri-Food industry) and Food Enterprise Zones (i.e. South Lincolnshire Food Enterprise Zone – with the University of Lincoln as an anchor tenant).
- 3.8** GLLEP is seeking to increase the international competitiveness of its agri-food sector through establishing Lincolnshire as 'UK's Food Valley', with a focus on accelerating food chain automation and digital technology adoption to delivery productivity and high value jobs; delivering low carbon food chains utilising low carbon technologies for production, processing and distribution; and developing the market for foods in which Greater Lincolnshire specialises. The UK Food Valley already supports Europe's largest Agri-food tech automation and robotics cluster, including a test-bed for investors⁸⁹.

Energy

- 3.9** The Energy sector is also identified as a priority sector for Greater Lincolnshire – specifically, Green Energy is identified as a 'game changer' for the region. Much of this sector is clustered around the Humber Estuary, both in terms of existing (e.g. Grimsby is one of the largest offshore and maintenance supply bases in the UK) and proposed (e.g. proposed Able Marine Energy Park) assets and projects.
- 3.10** Despite have a host of existing assets for energy generation such as offshore wind farms, anaerobic digester plants, electricity and heat generating businesses; energy constraints are present especially for housing and commercial sites. As result, developments have delayed because of a shortage of power or increased unforeseen costs relating to energy upgrades. Therefore, GLLEP aim to ensure that places can benefit from the varying energy generating capacity through localised energy solutions and creating a rural test bed for new energy technology. There are opportunities for local energy solutions such as solar panels, anaerobic digestion, and energy battery storage to be assessed and realised within the construction sector. Sustainable Urban Extensions (SUEs) that provide strategic housing and employment

⁸⁸ Local Industrial Strategy Evidence Base. 2019. Greater Lincolnshire LEP.

⁸⁹ Greaterlincolnshirelep.co.uk, Accessed [Here](#)

provision provide an opportunity for collaboration with local developers and contractors that are providing these solutions within their operations⁹⁰.

Ports and Logistics

- 3.11** Greater Lincolnshire has many coastal and inland ports that are crucial to the UK's export and import market as 95% of the UK's goods travel by sea. Additionally, 75% of UK manufacturing is within a 4-hour drive of the Humber Estuary Ports⁹¹. While undoubtedly an important component of GLLEP's economy; the transport and storage sector has seen a decrease in productivity and GVA from 2012 to 2017⁹². Maximising the efficiency of ports through innovation in digitisation and manufacturing capabilities is viewed as a key priority. Port Enterprise Zones enable an increasing amount of manufacturing, processing, and assembly activity to take place; modular building is noted as one of several specialities where this type of activity is happening. Commitments include enabling employment land to come forward for port-related commercial activity through existing Growth Deal and other private and locally led investment, working with landowners to overcome barriers, and responding to market demand and requirements.
- 3.12** The ports of Goole, Hull, Humber South Bank, and Grimsby and Immingham have been granted Freeport status and are collectively known as the Humber Freeport (as shown in Figure 3-1 below). It will be the largest Freeport in the UK and is identified as a potential 'game changer' by the GLLEP. It is developing its own skills strategy⁹³. Each port will offer a different range of incentives such as Custom or Tax Zones. One of the central priorities for the Humber Freeport will be to spur growth by handling increased volumes of trade and attracting more value-added manufacturing activity⁹⁴.
- 3.13** The Port of Boston imports steel and timber products to supply the construction sector, and whilst growth plans for the Port feature a significant focus on food and fresh produce processing and logistics (linked to Boston Town Deal investment in a Centre for Food and Fresh Produce Logistics, supporting the wider South Lincolnshire food knowledge cluster), there is potential complementarity between the growth of MMC manufacturing in proximity to the Port – as a point of entry for materials – and a degree of transferable skills between sectors.

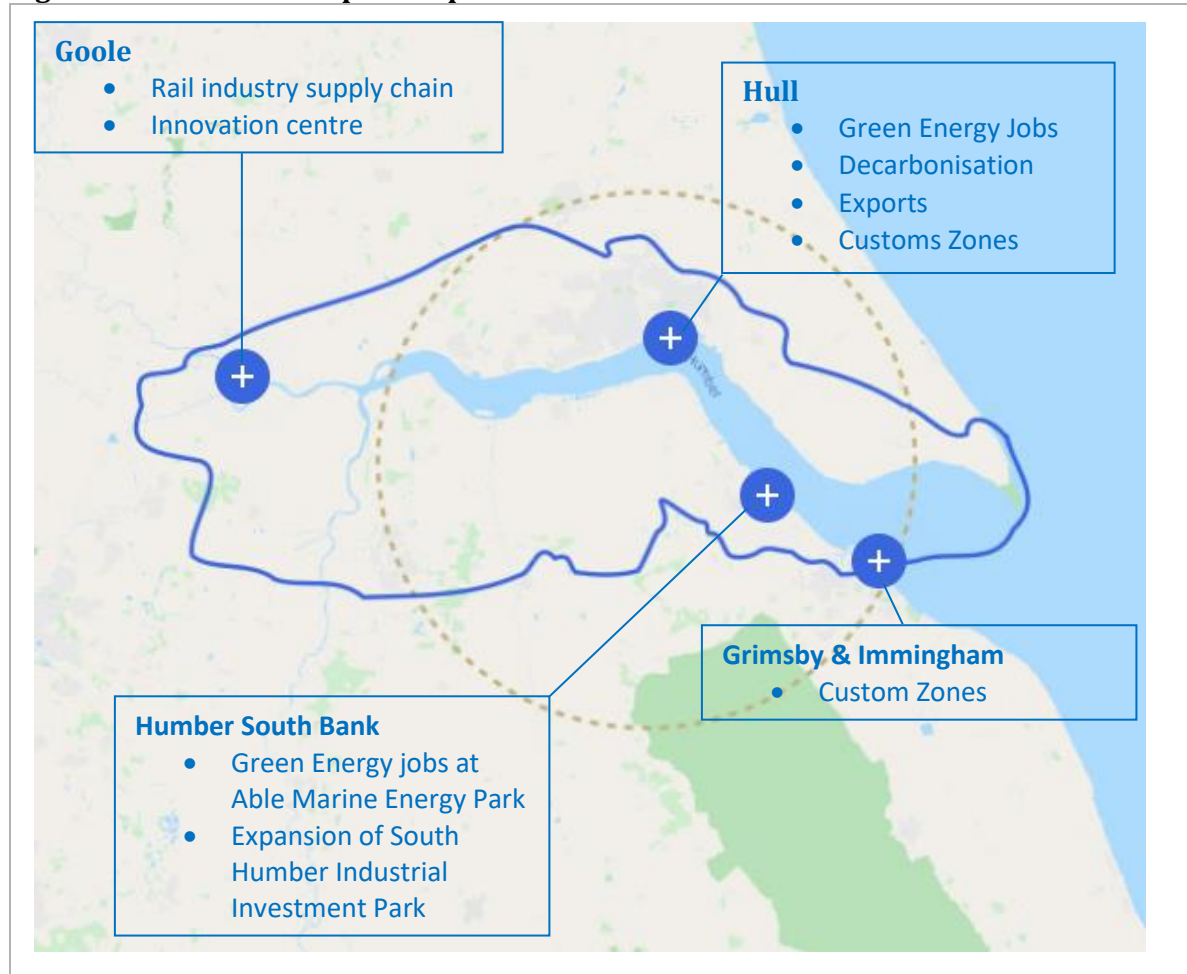
⁹⁰ Local Industrial Strategy Evidence Base. 2019. Greater Lincolnshire LEP.

⁹¹ Local Industrial Strategy Evidence Base. 2019. Greater Lincolnshire LEP.

⁹² Local Industrial Strategy Evidence Base. 2019. Greater Lincolnshire LEP.

⁹³ Local Skills Report. January 2022. Greater Lincolnshire LEP Employment and Skills Advisory Panel

⁹⁴ Protecting, Progressing, Prospering: Greater Lincolnshire's Economic Plan for Growth, March 2021, GLLEP

Figure 3-1: Humber Freeport Map

Source: [Humberfreeport.org](https://www.humberfreeport.org)

Manufacturing

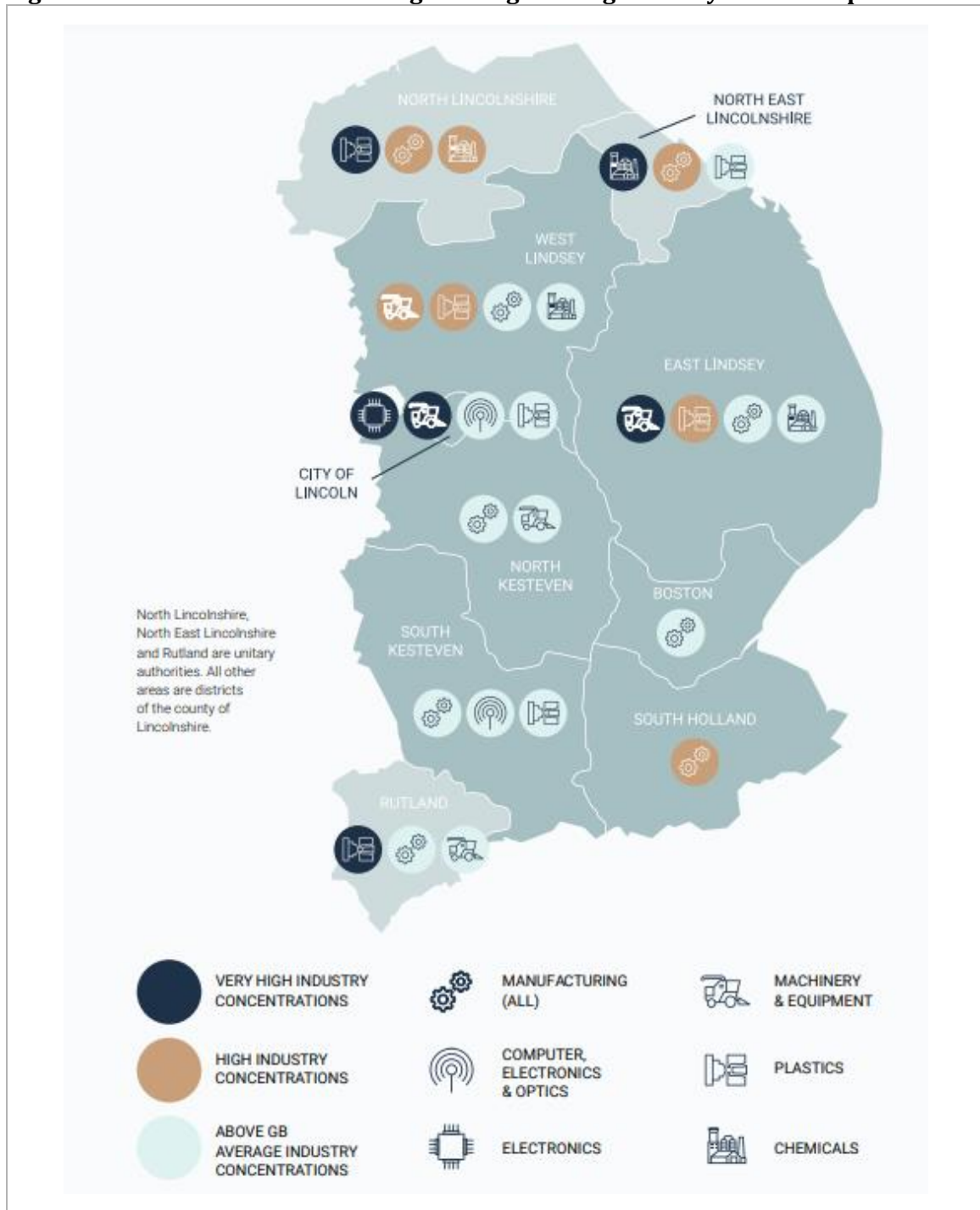
- 3.14** Manufacturing is identified as a priority sector for the LEP, reflecting the fact it comprises a significant proportion of the economic output for the region (c. 19.7% of GVA in 2020⁹⁵).
- 3.15** Advanced manufacturing and engineering is further identified as a key driver of Greater Lincolnshire's post-Covid recovery⁹⁶ with over 63,000 people working in manufacturing across the region at a far greater concentration than the national average⁹⁷.
- 3.16** Analysis by GLLEP (see Figure 3-2 below) has identified existing manufacturing clusters across the region, reflecting the presence of leading companies in the defence, agricultural, automotive and power generation sectors. Significant clusters in employment terms are in North East and North Lincolnshire.

⁹⁵ Midlands Engine Observatory, Intelligence Briefing: Gross Value Added (GVA), May 2022, Accessed [Here](#)

⁹⁶ Protecting, Progressing, Prospering: Greater Lincolnshire's Economic Plan for Growth, March 2021, GLLEP

⁹⁷ ONS BRES 2019

Figure 3-2: Advanced Manufacturing and Engineering Industry Cluster Map



Source: GLLEP Advanced Engineering & Manufacturing Investment Opportunity

Skills and education

Key points

- There are skills shortages across Greater Lincolnshire in key sectors relevant to MMC including advanced manufacturing, construction and engineering – these problems are forecast to worsen
- There is a higher proportion of SMEs in Greater Lincolnshire compared with the national average, which brings challenging for retraining and upskilling staff
- Retaining young people by demonstrating and delivering career opportunities is a key priority to address multiple challenges
- Similarly, upskilling and training the labour force to be equipped for jobs for the future (including digital skills) is an increasingly high priority
- Investments have been made across Greater Lincolnshire in developing curricula and delivering facilities, particularly in the context of Further Education, to support the development of education and skills pathways for ‘future’ industries – particularly around agriculture, engineering and manufacturing, ICT, science and mathematics. Lincolnshire’s Institute of Technology – with multiple partner and delivery organisations – is central to this.
- Lincolnshire’s Institute of Technology is intended to deliver a step change in skills provision and productivity in Greater Lincolnshire, but it is notable that construction sector does not feature as a priority within the IoT’s scope.

3.17 The Local Skills Report prepared by Greater Lincolnshire Employment and Skills Advisory Panel in January 2022 identified several key strengths and challenges facing the labour market, including:

- Greater Lincolnshire has a **lower job density** (0.79) than the national average (0.87). Linking labour supply to jobs is a challenge especially with Greater Lincolnshire’s mobility issues⁹⁸.
- While there are high-growth opportunities in growth sectors such as advanced manufacturing; there is a **skills shortage of higher level and technical residents including food, manufacturing, construction, engineering, and hospitality**⁹⁹. Moreover, the number of school leavers over the next few years will not be enough to fill predicted vacancy levels at Level 3 and above¹⁰⁰. Therefore, the **retraining of adults will be very important to address the skills gaps**.

⁹⁸ Greater Lincolnshire Local Skills Strategy. 2022. Greater Lincolnshire LEP.

⁹⁹ Greater Lincolnshire Apprenticeship Strategy. 2021. Greater Lincolnshire LEP.

¹⁰⁰ Greater Lincolnshire Apprenticeship Strategy. 2021. Greater Lincolnshire LEP.

- In January 2022, maintenance engineers, metalworking and production operatives were the toughest jobs to fill (based on the length of time the job was advertised for)¹⁰¹.
- The agricultural, horticultural and food manufacturing sectors, have vacancies across all levels including manual roles, supervisory jobs, machine operatives, quality control and engineering, that they cannot fill¹⁰².
- **GLLEP has a higher proportion of SMEs (45%) than the national average (32%).** The report found that smaller **SMEs may struggle to resource and upskill employees** and offer structure work placements if they do not have a dedicated HR and learning development team¹⁰³.
- **From 2017-27, Greater Lincolnshire is expected to need to fill 175,000 jobs;** 95% of positions will become available because of people retiring¹⁰⁴. The same acute issue that the national construction sector is facing. The figure of 175,000 jobs does not factor in the loss of EU workers because of Brexit, supply chain issues or structural labour supply changes because of COVID-19. The need to replace jobs will present opportunities for others in a range of sectors¹⁰⁵.

Considering the challenges such as skill gaps, geographic disparity and low qualification levels, the overarching aim of the Skills Strategy is to ensure that residents have the ability and resources to access the increasingly digital local labour market and fulfil their potential. **Improving the level of digital and specialist technical skills is central to the realisation of GLLEP's priority's sectors.**

Key priorities include¹⁰⁶:

- Increase the amount of young people choosing to stay local by showcasing and promoting employment opportunities. This will be done by **improving access to local career opportunities through a new GLLEP Career Hub** and ensuring all secondary mainstream, SEND schools, and Colleges have access to the Enterprise Advisor Network.
- Support important sectors to fill vacancies and improve the potential opportunities for local people through developing sector boards to **develop skills in priority statements. Manufacturing and engineering will have its own sector board.** While construction is not a key sector, manufacturing and engineering is a very broad specialism with varying skills that MMC can sit within.
- **Upskilling and retaining people for jobs of the future** through engaging with employers, apprenticeship providers, local partners and community and third-party organisations. Training is not inclusive of young people only; adults who are changing

¹⁰¹ Greater Lincolnshire Local Skills Strategy. 2022. Greater Lincolnshire LEP.

¹⁰² Greater Lincolnshire Local Skills Strategy. 2022. Greater Lincolnshire LEP.

¹⁰³ Greater Lincolnshire Local Skills Strategy. 2022. Greater Lincolnshire LEP.

¹⁰⁴ Greater Lincolnshire Local Skills Strategy. 2022. Greater Lincolnshire LEP.

¹⁰⁵ Greater Lincolnshire Local Skills Strategy. 2022. Greater Lincolnshire LEP.

¹⁰⁶ Greater Lincolnshire Local Skills Strategy. 2022. Greater Lincolnshire LEP.

professions or getting back into work also require training to ensure there are enough people with the right skills in the future.

- **Enhancing residents' digital skills across all levels** is necessary to ensure residents can respond to changing working practices as result of the COVID-19 pandemic, especially when rurality and isolation challenges present in Greater Lincolnshire. GLLEP will undertake work to understand, promote and grow digital skills at all levels. Additionally, succession planning, and workforce development requires engagement with businesses to ensure training and strategies are effective.
- Much of the success of the **priority sectors are reliant on modernisation and automation**. While GLLEP know there is high demand for technical, managerial and specialist skill sets understanding the local make-up of sectoral skills is necessary to understand skill gaps.

3.18 Greater Lincolnshire has a skills shortage in the context of the planned growth in its priority sectors. Much weight is given to the priority sectors as well as advanced manufacturing. Construction is not identified by the LEP as a priority sector; it employs a third of the number of people in Greater Lincolnshire compared to Manufacturing and Health¹⁰⁷. Nevertheless, it is recognised in the Skills Report **additional modules will be required in construction training programmes to deal ensure skills are linked to the clean growth and decarbonisation agenda including, housing retrofit, installing heat networks and EV charging infrastructure roll out**.

3.19 The **level of development projected in the local plans results in local demand for skilled construction and building trades**¹⁰⁸. Further demand can be evidenced by the expansion of the Construction and Automotive Skills Centre at Stamford College which received £2.13m of LEP investment through the Getting Building Fund¹⁰⁹. The expansion is response to a significant growth in student applications alongside increased demand for appropriately skilled and qualified workforce. Current courses include traditional trade training while the funding enables new courses including heritage stonemasonry, BIM, digital engineering technician apprenticeship and sustainable construction¹¹⁰.

3.20 It is also notable that significant investment has been made, and is planned, across Greater Lincolnshire into delivering facilities and institutions / curricula to provide training and education in the context of 'jobs for the future'. For example, the delivery of the Engineering, Manufacturing and Technology Centre at Boston College, the Lincolnshire Institute for Technology (involving Further and Higher Education partners across Greater Lincolnshire),

¹⁰⁷ Business Register and Employment Survey 2020, Office for National Statistics. Accessed at: Local Skills Strategy. 2022. Greater Lincolnshire LEP.

¹⁰⁸ Local Skills Strategy. 2022. Greater Lincolnshire LEP.

¹⁰⁹ LEP approves £2.1m grant for expansion at Stamford College. March 2021. Greater Lincolnshire LEP News.

¹¹⁰ Local Skills Strategy. 2022. Greater Lincolnshire LEP

and planned delivery – via the Towns Fund – for a Digital, Transport and Logistics Academy in Boston, and a Learning Campus in Skegness.

3.21 Through desk-based research, we have identified secondary, Further Education and Higher Education institutions that provide construction courses.

| Institution | Course Type | Relevant Courses & Research specialisms |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Higher Education | | |
| The University of Lincoln | Provides a range of undergraduate courses, postgraduate programmes, Foundation Degrees, and Degree Apprenticeships | Construction Science and Management (BSc Honours, MSc, MPhil/PhD) Engineering Degree Apprenticeships |
| University Technical Colleges | | |
| Humber UTC, Scunthorpe | Renewable and engineering focused curriculum for Years 9 - 12 | Construction and the Built Environment is an optional subject in year 10 & 11 |
| Lincoln UTC | Curriculum includes Science, Engineering, Maths, English, Computer Science, Business Studies, and Art & Design | Engineering courses include Engineering design, engineering manufacturing, engineering systems & controls, design & technology, T levels in engineering |
| Further Education | | |
| Riseholme College | Full time courses: Agriculture, Animal Management, Arboriculture (Trees and Timber), Equine, Horticulture, Land-Based Engineering. Apprenticeship: Engineering and Construction | No apprenticeships in engineering or construction at the time of writing |
| Grimsby Institute Group | Further and Higher Education Courses | Adult course: Construction (traditional). HE Course: HND & HNC Construction. Full time course: Construction Management, Anglian Water Alliances Construction programme |
| Lincoln College | Apprenticeship (Level 2 -3) | Bricklayer, Plastering, Carpentry & Joinery, Advanced Carpentry and Joinery, Furniture Manufacturer, Bespoke Furniture Makes, Painter & Decorator, Property Maintenance Operative, Civil Engineering Technician (Level 3), Plumbing and |

| Institution | Course Type | Relevant Courses & Research specialisms |
|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Stamford College | Diploma Level 1 & Apprenticeship Level 2 | Domestic Heating Technician (Level 3), Construction Site Engineering Technician (Level 3) Property Maintenance Operative (Level 2). Construction Multi Skills Diploma (Level 1) |
| North Lindsey College | HNCs, HNDs, Degrees and new Foundation Degrees | T level – Surveying and Design for Construction and the Built Environment Construction apprenticeships (level 2 to 4) carpentry and joiner; plumbing and domestic; groundwork; bricklayer; automation and controls engineering technician HNC in Construction and the Built Environment |
| Grantham College | Apprenticeships, C&G Level 1 to level 3, NOCN Diploma, | Traditional construction skills – carpentry, bricklaying, plumbing and heating, plastering CAD level 1 to 3 |
| Boston College – including the Engineering, Manufacturing and Technology Centre, and Digital Transport and Logistics Academy | Technical Certificate Level 1 & 2 Diplomas and apprenticeships in transferable areas | Bricklaying Potential transferable skills between, for example, engineering-led diplomas and MMC manufacturing systems |

Source: SQW analysis, 2022

Greater Lincolnshire's construction sector (economic profile)

Key points

- The construction sector is the 5th largest sector in Greater Lincolnshire (by GVA)
- The majority of construction businesses (c. 95%) in the county employ less than 10 people, highlighting the importance of SMEs in the construction sector
- The construction sector is growing particularly strongly in North Lincolnshire and North East Lincolnshire – more people are employed in construction in North Lincolnshire relative to the national average; West Lindsey also has an above-average concentration of the construction sector however this has reduced in size recently

Economic output and productivity

3.22 Total GVA (productivity) for the construction sector across the Greater Lincolnshire LEP (GLLEP) area was £1.4bn in 2020¹¹¹ - construction is the fifth largest sector by GVA in Greater Lincolnshire, behind retail and hospitality, real estate activities, public services and manufacturing¹¹²

Business count

3.23 ONS Business Register and Employment Survey (BRES) data shows that construction businesses make up between 13% - 16% of the total businesses in each upper tier local authority within the LEP area. Each upper tier local authority has a location quotient greater than 1 indicating that there is a larger share of construction enterprises in comparison to the national average, with particular concentrations in North East Lincolnshire.

Table 3-1: Number and percentage of construction businesses by upper tier local authority in GLLEP in 2020

| | Number of construction businesses | % | LQ | % Change 2015-20 |
|-------------------------|-----------------------------------|-----|------|------------------|
| Lincolnshire | 3,955 | 14% | 1.10 | 16% |
| North East Lincolnshire | 735 | 16% | 1.24 | 12% |
| North Lincolnshire | 730 | 13% | 1.03 | 11% |
| GLLEP LEP Total | 5,420 | 14% | 1.10 | 15% |

¹¹¹ Midlands Engine Observatory, GVA by Broad Industry Description 2020, Accessed [Here](#)

¹¹² Metro Dynamics analysis ONS GDP Quarterly Estimates via GLLEP's Economic Monitoring Dashboard, 2022

Note: Location quotient (LQ) shows the proportion of businesses per sector against the national average (England). Source: Business Register and Employment Survey, 2022

3.24 The majority (92% - 95%) of construction businesses in Greater Lincolnshire are micro businesses employing between zero to nine employees. Lincoln and North Lincolnshire have the highest proportion of small businesses (both 7%) relative to total construction businesses which represents 25 and 50 businesses, respectively.

Table 3-2: Size of construction businesses by employment

| Location | Micro (0-9) | Small (10-49) | Medium | Large |
|-------------------------------|-------------|---------------|--------|-------|
| <i>Local authorities</i> | | | | |
| Boston | 240 | 15 | 0 | 0 |
| East Lindsey | 635 | 30 | 5 | 0 |
| Lincoln | 345 | 25 | 0 | 0 |
| North Kesteven | 645 | 45 | 5 | 0 |
| South Holland | 545 | 30 | 0 | 0 |
| South Kesteven | 805 | 35 | 5 | 0 |
| West Lindsey | 525 | 20 | 5 | 0 |
| <i>Upper tier authorities</i> | | | | |
| Lincolnshire | 3,735 | 200 | 25 | 0 |
| North East Lincolnshire | 690 | 45 | 5 | 0 |
| North Lincolnshire | 675 | 50 | 10 | 0 |
| <i>Comparator</i> | | | | |
| England | 290,170 | 14,140 | 1,670 | 275 |

Source: Business Register and Employment Survey, 2022

Employee count

3.25 Despite the overall 15% increase in construction businesses in Greater Lincolnshire from 2015 to 2020, employment (number of employees) has experienced an 8% reduction across the GLLEP area. There are substantial differences between local authorities too. North Lincolnshire has the highest proportion of construction employees despite having the lowest proportion of construction businesses. Additionally, North Lincolnshire has a significantly higher concentration of construction employees compared to the national average.

3.26 Both Lincolnshire and North East Lincolnshire have a lower concentration of employees when compared to the national average.

3.27 Whilst the number of construction employees in North East Lincolnshire have increased by 20% from 2015 – 2020; the number of employees in Lincolnshire has declined by 13%. Data therefore suggests that there is larger and growing construction workforce who reside in the north of the GLLEP area.

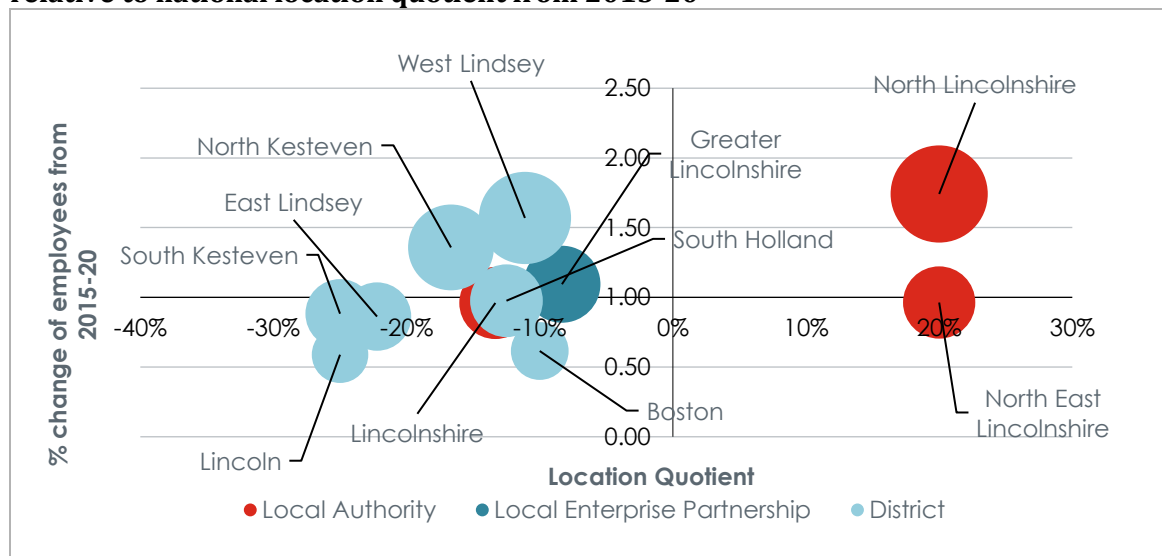
Table 3-3: Number and percentage of construction employees by local authority in GLLEP in 2020

| | Number of construction employees | % | LQ | % Change 2015-20 |
|-------------------------|----------------------------------|------|------|------------------|
| Lincolnshire | 13,000 | 4.5% | 0.96 | -13% |
| North East Lincolnshire | 3,000 | 4.5% | 0.96 | 20% |
| North Lincolnshire | 6,000 | 8.2% | 1.74 | 20% |
| GLLEP | 22,000 | 5.2% | 1.09 | -8% |

Note: Location quotient (LQ) shows the proportion of businesses per sector against the national average (England). Source: Business Register and Employment Survey, 2022

3.28 When taking a more granular look at construction employees by district, local authority and LEP area; data clearly suggests that a significant number of districts have a lower concentration of construction employees than the national average, especially Lincoln, South Kesteven, South Holland, East Lindsey, and Boston. West Lindsey and North Kesteven have a higher proportion of construction employees than the national average in 2020 but like all other districts experienced a reduction construction employees. North Lincolnshire and East North Lincolnshire is outperforming Lincolnshire.

Figure 3-3: Change in construction employees by district, local authority and LEP relative to national location quotient from 2015-20



Note: Location quotient (LQ) shows the proportion of businesses per sector against the national average (England). Source: Business Register and Employment Survey, 2022

An overview of the development and construction landscape in Greater Lincolnshire

Key points

- There are relatively few Category 1 or 2 MMC firms based in Lincolnshire and the majority are located beyond the county borders in the West and East Midlands, South and North Yorkshire (including north of the Humber)
- Proximity to major road infrastructure is important to location – including A1/M1 corridor, M5, M6 and M62/A63 corridor
- There are a number of identified ‘high-growth’ construction firms in Greater Lincolnshire but only one which has been identified as innovating and active in the MMC sector (UniBlock – based in Scunthorpe)

The existing MMC landscape in Greater Lincolnshire

- 3.29** There is no pre-existing list of all companies and manufacturers engaged in MMC. We have used a combination of reviewing BOPAS accredited technologies (and linked companies), Buildoffsite membership, literature review, internet searches and access to Beauhurst (database of high-growth firms) to build up a picture. We have also focused on those firms considered to be Category 1 or 2 MMC firms (3D and 2D systems) and those which work in the housing sector.
- 3.30** We have focused on firms within a c. 60-mile radius of Greater Lincolnshire to provide some focus to the searching. This is not intended to be a comprehensive database or picture of all MMC firms within the Greater Lincolnshire context – given the manual nature of our search it is inevitable we will have missed some firms.
- 3.31** However, what is clear from the output of this search is that there are relatively few Category 1 or 2 MMC firms based in Greater Lincolnshire – the small number of examples include **Techrete (North Lincs)** which supplies architectural precast cladding; and **FP McCann** which manufactures and supplies precast concrete¹¹³. The majority (within the 60 mile defined radius) are located in proximity to the motorway network, with particular concentrations in the West Midlands, East Midlands, South and North Yorkshire, often in proximity to the A1/M1 corridor, M5, M6 and M62/A63 corridor (including north of the Humber). Proximity to road network is a key driving factor, as is a concentration of existing, skilled employees.
- 3.32** The relatively small presence of Category 1 and Category 2 manufacturers from Greater Lincolnshire does not necessarily represent a barrier to the use and adoption of MMC products and systems by housebuilders active in this region, particularly given the relative

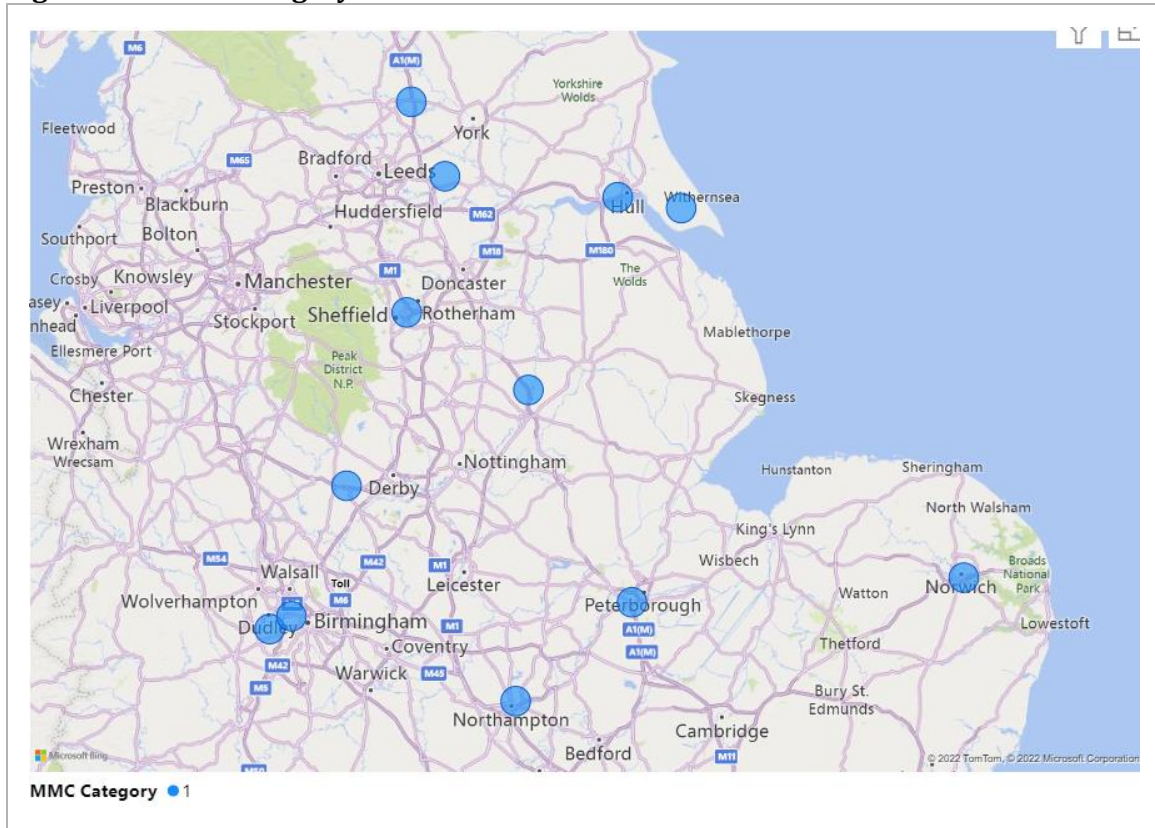
¹¹³ Mmc.market/suppliers – accessed [here](#)

proximity of Greater Lincolnshire to existing manufacturers based in, for example, South and East Yorkshire and the East Midlands. The costs of transport and logistics are an important determinant of the costs of MMC products – particularly for volumetric products – and whilst this varies significantly depending on specific systems and the characteristics, location and access arrangements for individual sites, these costs are currently unlikely to be the determining factor tipping the potential use of MMC in a Greater Lincolnshire context into unviability as these costs are within the context of a still relatively small sector still in its relative infancy which has generally not yet achieved economies of scale.

3.33 However, from a longer-term perspective there is a strong argument for seeking to encourage the growth of MMC manufacturing in Greater Lincolnshire:

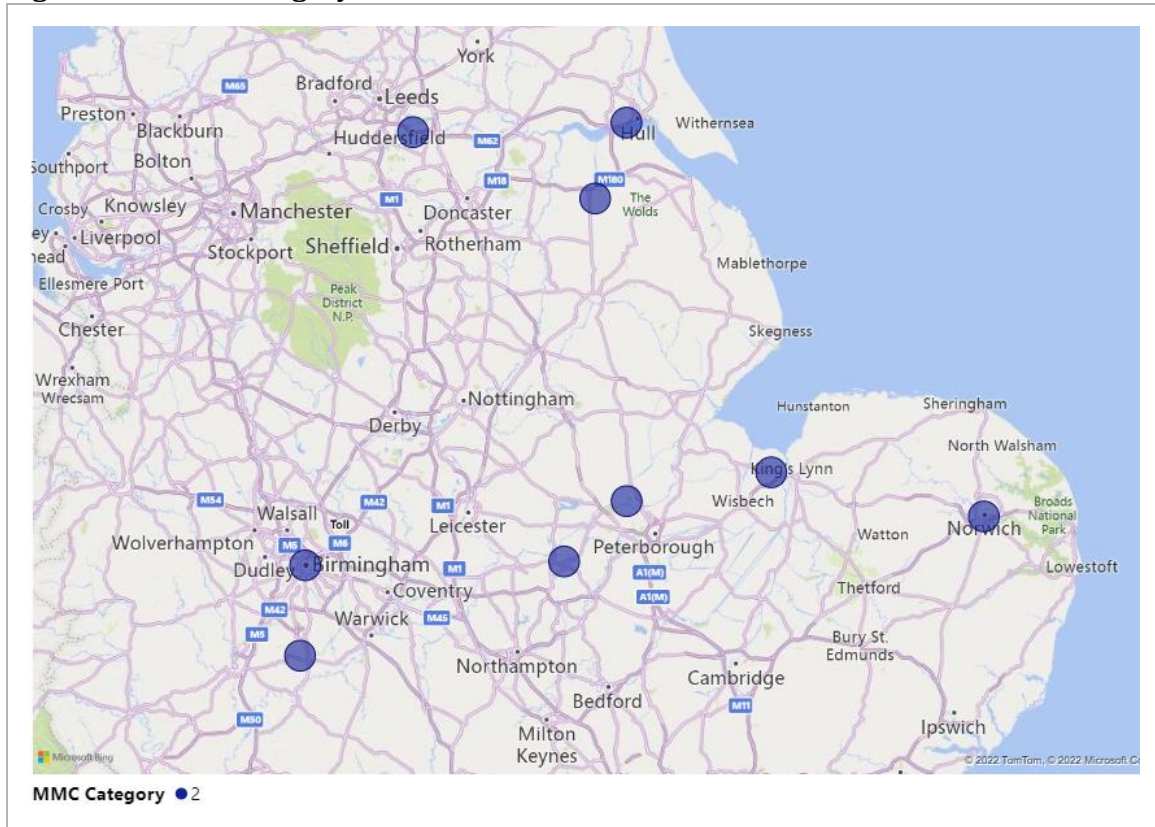
- Construction is an existing key employer in Greater Lincolnshire. The nature of many MMC systems and products is that the skills and trades involved in the construction process shift from site-based processes to factory-based. Whilst there are many systems which make use of existing trades and which still require on-site installation – indeed this is a positive thing for Greater Lincolnshire in the short-medium term as there is clear opportunity for existing trades and supply chain partners to work on both MMC site installation and traditional build schemes, which is positive for the resilience for the existing SME-dominated sector – in the medium-longer term as the share of the housebuilding sector supplied by MMC increases, particularly in response to legislative sustainability drivers, if the jobs associated with the manufacture of these systems are outside of Greater Lincolnshire then this is clearly a longer term threat to this segment of Greater Lincolnshire’s employment market.
- The MMC sector is growing. It has not achieved economies of scale yet and still makes up a very small proportion of the existing housebuilding sector. There is an opportunity for Greater Lincolnshire to become part of the growth trajectory of the MMC sector and to benefit from the economic productivity, jobs and skills advantages that could materialise through attracting manufacturers to base themselves in the region.
- Supporting the growth of the MMC manufacturing base and supply chain will feed into the growth of the sector as a whole and contribute to achieving economies of scale in the manufacturing process, the reduction of costs and the improved viability of using MMC in lower value locations, including many areas within Greater Lincolnshire.
- Greater Lincolnshire has existing strengths in manufacturing sectors so there is potential for transferability of skills and the creation of a more resilient and futureproofed labour force, subject to both the jobs being there and the skills and training pathways being in place. Diversifying Greater Lincolnshire’s manufacturing base to encompass MMC will support Greater Lincolnshire’s future green economy.

Figure 3-4: MMC Category 1 manufacturers within 60 miles of Greater Lincolnshire



Source: SQW analysis

Figure 3-5: MMC Category 2 manufacturers within 60 miles of Greater Lincolnshire



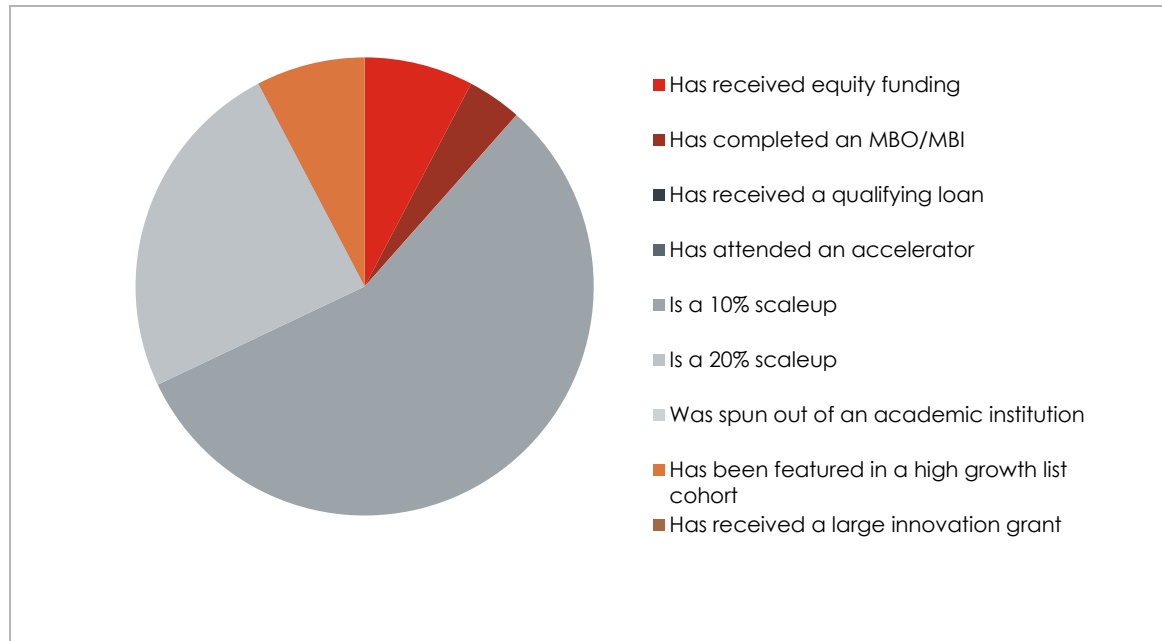
Source: SQW Analysis

High-growth construction firms in Greater Lincolnshire

- 3.34** This paper has utilised data sourced from Beauhurst’s database and platform which tracks high-growth firms across the UK. Importantly, the Beauhurst database does not capture all start-up or SME firms in any given location, only those which meet its triggers for ‘high-growth’¹¹⁴. Additionally, established industry primes – particularly multinationals will also unlikely be captured by this database. However, the nature of the triggers which provide the basis for the database – including comprehensive monitoring of the equity investment landscape, academic spinouts, and analysis of financial accounts over a ten-year period means that it is possible to gain a relatively comprehensive picture of high-growth companies in each area.
- 3.35** There are a total of 49 high-growth construction firms, representing 1% the total construction businesses based in GLLEP. Approximately, 65% of firms are ‘established’ which can be defined as defined as having been trading for 1+ years, or 5-15 years with a three-year consecutive profit of £5m+ or turnover of £20m+.
- 3.36** Approximately 20% of companies are in the ‘growth’ stage: companies which have been operating for 5+ years, likely having received regulatory approval and bringing in significant revenue and investment, with a valuation in the millions.
- 3.37** A smaller proportion of tracked companies (8%) are defined as being in the ‘venture’ stage – companies which have developed their business models and technology, have likely secured some investment, and have achieved some revenue.
- 3.38** The smallest category of GLLEP high-growth construction firms is those at the ‘seed’ stage – young start-ups with low employee counts, low valuation, and relatively small amounts of equity investment. Funding at this stage is usually sourced from grant awarding bodies, crowdfunding platform. Only one housebuilder in GLLEP has been identified as at seed stage which received £50,000 of fundraising.
- 3.39** The chart below illustrates the proportionate split between the different triggers resulting in Greater Lincolnshire’s firms being categorised and tracked as ‘high-growth’ firms by Beauhurst. It is possible for companies to hit multiple triggers, so this analysis focuses on the overall profile rather than numbers in real terms.

¹¹⁴ Beauhurst tracks over 45,000+ UK based high-growth firms which meet one or several their pre-defined triggers: (1) received equity investment (2) received venture debt (3) received a large innovation grant (4) graduated from a selected accelerator (5) underwent an MBO/MBI (6) scaled either 10% or 20% across a three-year period within the last 10 years (7) spun out from an academic institution (8) featured on a selected high-growth list

Figure 3-6: Reasons for Beauhurst tracking of Greater Lincolnshire's high growth firms



Source: SQW analysis, 2022

3.40 Analysis of the high-growth firms reveals that the majority operate in the traditional construction and development sector, for example sub-contractors providing services (e.g. mechanical and electrical, civil engineering, groundworks, demolition painting and decorating), manufacturers of components and materials (ironmongery, glazing etc), or developers and contractors delivering homes (e.g. Keigar Homes, Chestnut Homes etc).

3.41 The only high-growth manufacturing firm identified which categorises itself as an MMC firm is Uniblock. Uniblock is based in Scunthorpe and is a manufacturer of an innovative offsite insulating concrete form building system.

Consultation feedback

3.42 Following consultation with stakeholders key areas of feedback relating to MMC supply-side considerations are highlighted below:

- **FE skills and education demand** – demand from prospective students and businesses in relation to FE course provision in the construction sector is relatively traditional and focused on core trades. There has been relatively little in terms of market signals and demand for course provision in the MMC space. To an extent this is driven by the predominance of SME contractors and sub-contractors working largely on traditional building projects across Greater Lincolnshire. The focus of employers is being able to recruit and retain skilled trades to fulfil their order books in the short term, with less consideration of medium/longer term challenges/drivers (i.e. net zero carbon agenda).
- **FE skills and education supply** – there is an awareness amongst FE providers of the importance of MMC and the need to better articulate the benefits to employers and

prospective students of upskilling in this area. This will require close working and communication with industry partners. However, the funding model of FE providers is tied to student numbers, the requirements of awarding institutions (e.g. City & Guilds) and funding bodies. There is significant risk in delivering courses without supporting funding in place. Additionally, some manufacturers of sustainable technologies often utilised as part of MMC delivery (i.e. Ground Source / Air Source Heat Pumps) often provide free training to the trades which will be installing their proprietary systems, undermining the business case for FE course delivery.

- **FE and HE teaching staff / recruitment** – there are challenges with recruiting staff capable of teaching the MMC theory and associated skills given Greater Lincolnshire’s relatively traditional and SME dominated construction sector and broader challenges around geography and salaries etc.
- **FE appetite to innovate and diversify** – stakeholder feedback illustrated the appetite of FE providers to engage with MMC and work with industry, public and private sector stakeholders to ‘do things differently’ (e.g. ‘learning by doing’ – FE colleges delivering actual projects on a commercial basis for partners, and teaching students to apply learning in practice). There could be opportunities at Lincoln College, for example, to learn lessons from its Institute of Technology and potentially develop synergies between its course provision (particularly the focus on digital skills) and the more traditional construction course provision.
- **Transferable skills** – feedback from FE providers and contractors alike was that many of the MMC systems and technologies will rely on existing and transferable skills deployed in a slightly different way and that skills training could usefully focus on MMC theory ‘bolt ons’ to existing ‘traditional’ trades courses. A practical example was provided by a general contractor delivering homes using a Category 2 panellised MMC system and product which meant they could continue to use their existing carpenter sub-contractor for site installation as the system utilised their existing skill-set, supplemented by some in-house, product-specific training provided by the manufacturer. These sub-contractors were therefore able to deliver both MMC and traditional construction projects. This is an important point in terms of labour force resilience.
- **HE course provision** – Lincoln University is engaged with the MMC space and provides courses (i.e. MSc Construction Science and Management) which actively trains students in the theories and principles associated with MMC. Course provision is relatively small-scale currently. Appetite to deliver these courses is growing and demand is strong. The university works with industry partners to shape curriculum content and places a strong emphasis on work placements / industry experience. The university’s graduate pathways are strong and students frequently go on to work with national-scale infrastructure and construction businesses. However, very few of these companies are present or based in Greater Lincolnshire itself.

- **General construction skills shortages within Greater Lincolnshire** – various stakeholders reported shortages of available skills in different trades within the construction sector across Lincolnshire and highlighted the challenges of a rural geography and wide catchment.
- **Minimal MMC manufacturing presence in Greater Lincolnshire** – this feedback chimes with the desk-based review which did not identify many firms engaged in the manufacture of more advanced Category 1 or 2 (volumetric or panellised) systems in Greater Lincolnshire.

Supply-side review – key conclusions

3.43 The key conclusions from this supply-side review are highlighted below.

Supply-side review – key conclusions

- Construction is not recognised as an economic priority sector or employer in Greater Lincolnshire despite its importance as an employer and in underpinning growth – it is also a key growth sector in the north of the county
- Construction skills shortages are acknowledged at a Greater Lincolnshire, as well as national, level
- Key economic sectoral priorities for Greater Lincolnshire include agri-food, energy, ports and logistics
- Manufacturing clusters are particularly prevalent in the north of the county – there could be potential for transferable skills here; similarly with the logistics and distribution sector in the south of the county which would need to be considered in the context of specific MMC manufacturer skills requirements
- Significant investment and growth opportunities are apparent around the newly designated Humber Freeport and also Boston Port
- There are very few Category 1 or Category 2 MMC manufacturing firms in based in Greater Lincolnshire, although there are a number in relatively close proximity to the county
- MMC manufacturers typically locate in proximity to major road networks, where there is a pool of existing skilled (or transferable) labour, and where they have security of pipeline – not necessarily in close proximity, but sufficiently secure to justify capital investment
- The construction landscape of Greater Lincolnshire is dominated by SMEs – many of which are key employers, particularly in a rural context
- FE providers typically deliver relatively traditional construction related courses – and there is relatively little demand from employers or prospective students for anything else – but there is awareness of the challenges and opportunities presented by sustainable construction and MMC and the importance of upskilling to meet these challenges – and interest to engage further
- Lincolnshire’s Institute of Technology is focused on supporting enhanced skills in sectors which will unlock a step change in productivity for Greater Lincolnshire’s economy, and whilst many of these courses include potentially transferable skills (engineering, manufacturing), the construction sector does not fall within the scope of the IoT and its delivery partners

- Key barriers to expanding course provision – beyond insufficient course demand – include recruiting suitable staff, the requirements of accrediting institutions and funding requirements
- Lincoln University teaches some courses which include a focus on MMC but relatively small course numbers currently, and pathways to employment tend to not be in Greater Lincolnshire – there is appetite to do more in this space though.

4. MMC: Demand-side drivers in a Greater Lincolnshire context

Introduction

- 4.1** This section of the report provides an overview of the demand-side context and dynamics relevant to construction and the MMC sector in a Greater Lincolnshire context, covering the following:
- **Forecast housing need** – headline analysis of projected housing need for all tenures across Greater Lincolnshire and, relevant functional housing market areas, based on adopted and emerging Local Plans and associated evidence base.
 - **Historic delivery rates** – high-level analysis of historic housing delivery rates across all tenures across Greater Lincolnshire.
 - **Site allocations** – an overview of allocated housing sites within adopted planning policy with analysis of location and typologies.
 - **Viability context** – a snapshot of the viability context and evidence base underpinning adopted and emerging Local Plan policies across Greater Lincolnshire.
 - **Flood risk** – headline consideration of the location and nature of flood risk challenges across Greater Lincolnshire.
 - **Overview of the sector** – headline overview of the key housebuilders, developers, affordable housing delivery bodies in Greater Lincolnshire and the extent to which they are engaged in the delivery of new homes using MMC.

Forecast housing need vs historic delivery rates

- 4.2** The purpose of this analysis is to understand the overall projected housing need across Greater Lincolnshire. The purpose of this analysis is to contextualise the scale of the potential MMC opportunity in Greater Lincolnshire and to understand the order of magnitude. For the avoidance of doubt, potential demand is assessed in this context on the basis of the seven districts and two unitary authorities comprising Greater Lincolnshire, notwithstanding that two of the districts and one unitary are not part of the instructing client group.
- 4.3** It should also be noted that the baseline planning policy context for Greater Lincolnshire is a relative patchwork, with adopted and emerging Local Plans, and their associated evidence bases, all being at different stages.
- 4.4** We have, therefore adopted a simplified approach to ascertaining the aggregated approximate forecast annual housing need: adopted Local Plans for all local authorities provide projected housing need requirements for the 5-year period 2022-2026; for the

subsequent 5-year period (2027-2031) we have incorporated projections based on emerging evidence bases for Local Plans – where they exist – combined with adopted Local Plans, where relevant.

- 4.5** Additionally, projected housing need has been provided separately for Peterborough and Rutland, both considered part of a functional housing market area (comprising Peterborough, Rutland, South Holland and South Kesteven).
- 4.6** The outcome of this analysis is presented in Figure 4-1 below.

Figure 4-1: Greater Lincolnshire and linked functional Housing Market Area (HMA) projected housing need (adopted and emerging Local Plan evidence)

| | 2022-26 | 2027-31 |
|--------------|--------------------|--------------------|
| Lincolnshire | 4,955 homes p/a | 4,408 homes p/a |
| Wider HMA | 1,140 homes p/a | |
| Total | 6,095 homes p/a | 5,548 homes p/a |

Source: SQW analysis of adopted and emerging Local Plan evidence base for the seven districts and two unitary authorities comprising Greater Lincolnshire

- 4.7** This data provides an approximate flavour of the projected housing need for Greater Lincolnshire, and its wider housing market area, over the next ten years.
- 4.8** Importantly, these figures are derived directly from Local Plans and their associated evidence bases. It is important to note that the UK Government collects and publishes data relating to annual required housing and annual housing delivery rates, and these figures are calculated slightly differently to the stated Local Plan evidence base figures. In essence, the Local Plan figures are somewhat higher than the UK Government's stated housing requirements for the Greater Lincolnshire local authorities. This report is not the place for a detailed comparative assessment of the methodologies employed and the discrepancies at the level of each planning authority.
- 4.9** Instead, we have highlighted data from the most recent UK Housing Delivery Test to compare and contrast reported housing delivery against assessed needs. We have undertaken our own analysis of housing delivery across Greater Lincolnshire using Annual Monitoring Report data

and other figures reported in Local Plan evidence bases, however the published data is incomplete. For consistency we have therefore relied on the housing completions data reported as part of the Housing Delivery Test results published by the UK Government, recognising this data relies on submissions from local authorities.

Figure 4-2: UK Housing Delivery Test Results 2021

| | 2018-19 | 2019-20 | 2020-21 |
|--------------------------------|---------|---------|---------|
| Homes required | 3,478 | 3,162 | 2,287 |
| Homes delivered | 4,758 | 4,557 | 3,989 |
| 2021 Delivery Test Measurement | 137% | 144% | 155% |

Source: Department for Levelling Up, Housing and Communities – 2021 Housing Delivery Test Results (14 January 2022)

- 4.10** Interestingly, the UK Government’s Housing Delivery Test data implies that their own calculation of housing need is significantly lower on a per annum basis than either the cumulative adopted or emerging Local Plan data for Greater Lincolnshire would suggest.
- 4.11** Based on the Housing Delivery Test requirements, Greater Lincolnshire has comfortably exceeded required housing delivery rates. Even if we compare delivery rates with the higher Local Plan requirements, it is evident that Greater Lincolnshire is broadly building enough homes to meet the need assessed at the level of Local Plans (particularly if we adjust for the impact of Covid-19 which resulted in slightly lower delivery rates during 2020-21).
- 4.12** It is, however, acknowledged that there is significant geographic variation within the County and, for instance, within the Central Lincolnshire (City of Lincoln, North Kesteven and West Lindsey) which is as a whole delivering homes in excess of identified need (as per the UK Government’s Housing Delivery Test), the City of Lincoln is not currently delivering homes sufficient to meet localised need. This point was emphasised by stakeholders during consultations.

Affordable housing

- 4.13** It is important to contextualise total forecast housing need with projected affordable housing requirements. Objectively assessed need for affordable housing is balanced against a range of considerations, not least financial viability in line with the requirements of the National Planning Policy Framework (NPPF), when local planning authorities set planning policy

requirements regarding the proportion of new housing required to be delivered as affordable homes. We have presented a simplified overview of projected affordable housing need in the context of both overall housing requirements and typical affordable housing planning policy requirements at an aggregated Greater Lincolnshire level. Clearly each local authority has their own policy requirements with affordable housing thresholds and criteria which take into account contextual factors including location, constraints and market factors (viability; flood risk) and scale of development. The 'typical' policy requirement therefore is an aggregated figure considered at a Greater Lincolnshire level rather than a truly accurate figure for each and every local authority area. Again, the emphasis here is on establishing aggregated figures to contextualise the order of magnitude of potential affordable housing requirements. Again, projected affordable housing needs have been taken from adopted planning policy and evidence for the period 2022-26, and from a combination of emerging (where available) and adopted (where applicable) Local Plans and evidence for the period 2027-31.

Figure 4-3: Greater Lincolnshire forecast housing need: total need, and affordable housing need (adopted and emerging Local Plan evidence)

| | 2022-26 | 2027-31 |
|-------------------------|-------------------------------|--------------------|
| Total need | 4,955 homes p/a | 4,408 homes p/a |
| Affordable housing need | 2,728 Homes p/a | 2,337 Homes p/a |
| Total | 55% | 53% |
| Policy range | 20-25% typical Range:0-40% | |

Source: SQW analysis of adopted and emerging Local Plan evidence base for the seven districts and two unitary authorities comprising Greater Lincolnshire

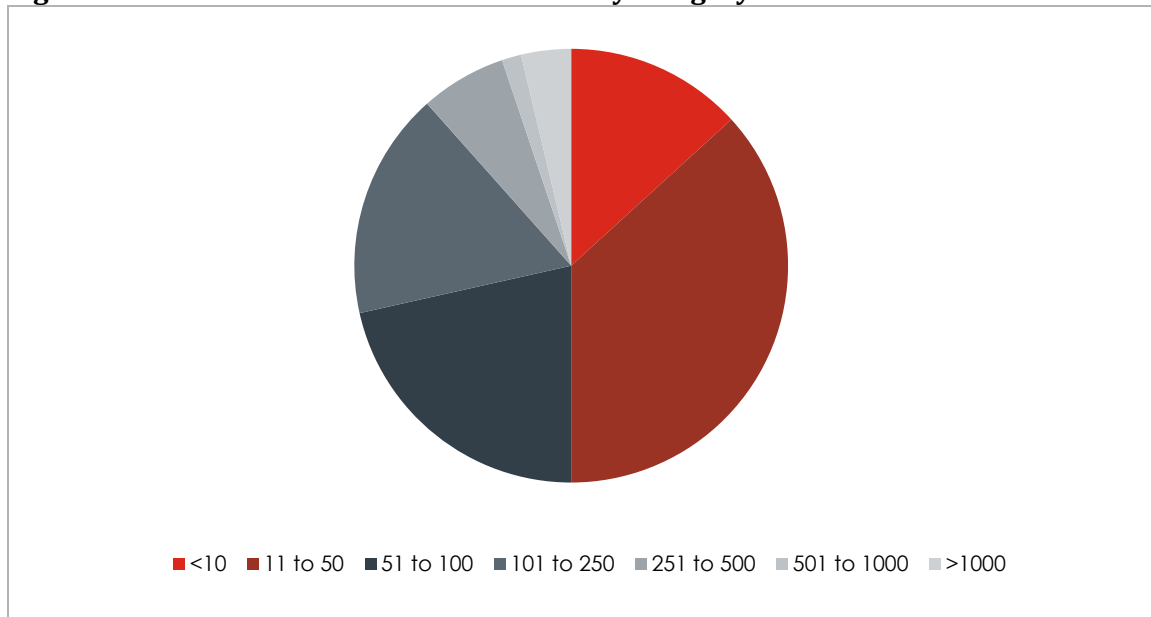
Site allocations

4.14 This section considers the broad spread and composition of site allocations across Lincolnshire – as per adopted Local Plans - with consideration of key characteristics including allocation size, characteristics and locations.

- 4.15** The purpose of this section is not to provide granular detail on how delivery of specific site allocations is progressing – noting that many were allocated in Local Plans some years ago now. The intention is to provide an aggregated view of demand for and delivery of housing over the coming years.
- 4.16** There are c. 77,000 homes allocated in c. 485 site allocations contained in the adopted Local Plans (noting that we used North Lincolnshire’s Reg 19 emerging Local Plan as the relevant source here rather than the outdated adopted Local Plan) of Greater Lincolnshire’s various planning authorities. It should be noted that these figures are highly approximate. All of the Local Plans cover different periods and identify / report allocations differently¹¹⁵. This headline figure – and indeed those presented below – does not provide any details on progress in delivering against specific allocations since the adoption of the Local Plan and is a highly approximate figure. The intention is instead to paint an overall picture of the scale and nature of where and how future housing demand will be delivered.
- 4.17** Figure 4-4 below illustrates that, perhaps unsurprisingly, over 50% of all site allocations (c. 244) relate to relatively small sites accommodating 50 homes or less. Conversely, Figure 4-5: illustrates that c. 45% of all allocated homes – c. 34,000 - will be delivered by 19 large site allocations for 1,000 + homes.

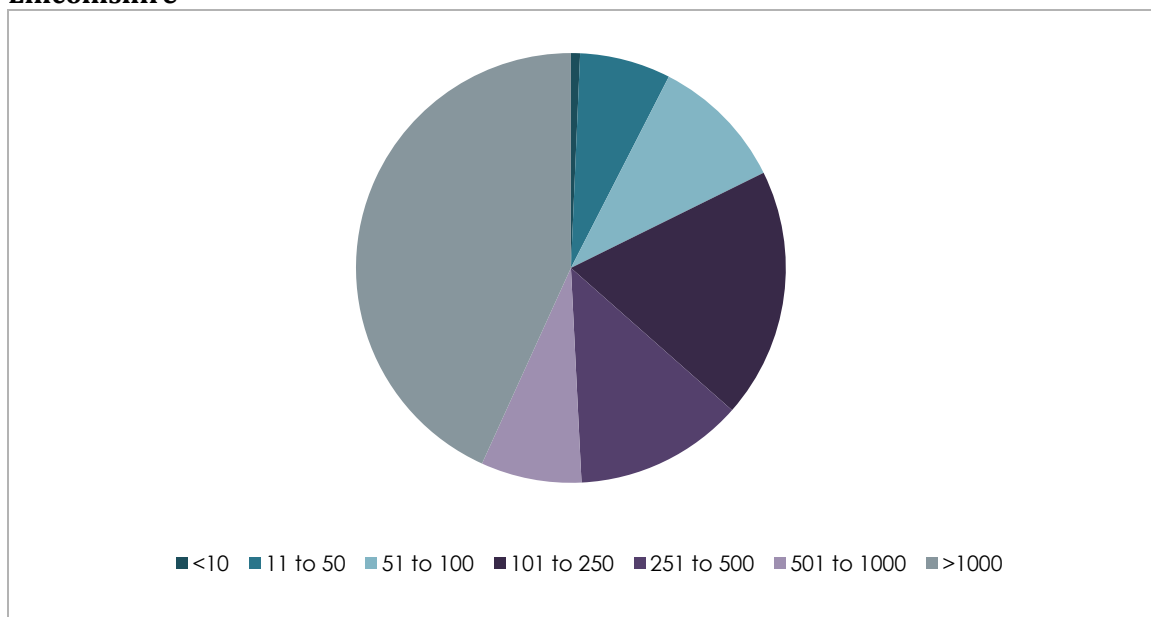
¹¹⁵ It should be noted that this is an approximate figure. Each of the adopted Local Plans presents their site allocations in a different way: some include permitted / committed schemes as allocations (without distinguishing which ones these are); others report permitted and committed sites separately. Some local authorities allocate small sites including <10 units; others choose not to specify allocations below 25 homes. The Local Plan periods are all different. For instance, the South East Lincs (Boston and South Holland) Local Plan was adopted in 2019 covering the period 2011-2036 – total projected housing numbers included homes built and/or permitted in the period 2011-17, and omit these sites from the proposed allocated sites; North East Lincolnshire’s Local Plan includes allocations covering the period 2017-32 and includes allocations (without distinguishing between them for both proposed allocations and committed sites (i.e. already permitted but not built out)).

Figure 4-4: Total number of site allocations by category across Greater Lincolnshire



Source: SQW analysis of Lincolnshire local authorities' adopted Local Plans

Figure 4-5: Housing numbers per site allocation size category across Greater Lincolnshire



Source: SQW analysis of Greater Lincolnshire local authorities' adopted Local Plans

Overview of proposed housing growth: distribution, viability & flood risk

4.18 We provide a high-level overview below of the key characteristics of the proposed growth when considering the inter-related factors of spatial distribution, viability and flood risk. Again, this is not exhaustive but is considered at a high-level ahead of consideration of potential implications for MMC.

Table 4-1: Overview of proposed housing growth and distribution across Greater Lincolnshire

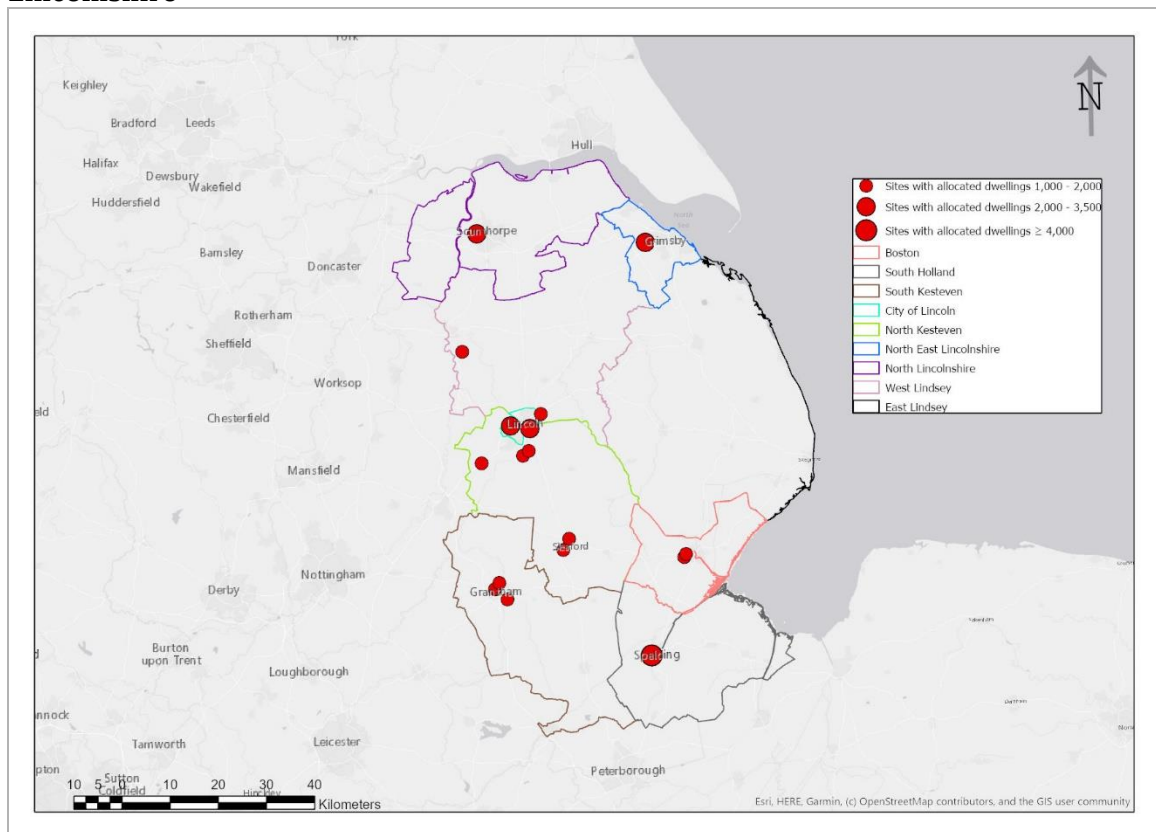
| Local Plan area | Key characteristics |
|----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| South-East Lincolnshire (Boston; South Holland) | <ul style="list-style-type: none"> - Significant growth directed to Sustainable Urban Extensions (SUEs) around Boston and Spalding - Flood risk is a major constraint, particularly in Boston Borough, notwithstanding recent flood defence projects such as the Boston Barrier. Much of Boston sits in Flood Zone 3. - Viability is more challenging in Boston than South Holland (note lower affordable housing target of 20% vs 25% in South Holland) |
| Central Lincolnshire (City of Lincoln; West Lindsey; North Kesteven) | <ul style="list-style-type: none"> - Higher value areas in proximity to Lincoln and more affluent market towns - Significant opportunities around SUEs where the City of Lincoln has a land ownership interest - Lower and mid value areas include Sleaford and Gainsborough - Significant growth proposed for SUEs around Lincoln, Sleaford and Gainsborough - Viability challenges of delivering these major sites are acknowledged, particularly regarding infrastructure costs and affordable housing cumulatively (flood risk less of an issue). Note Homes England intervention at the Western Growth Corridor SUE as evidence - Affordable housing requirement of 25% within Lincoln strategy area (excluding SUEs), 20% on Lincoln SUEs and 15% on other SUEs - Smaller housebuilders have tended to predominate but increased housebuilder presence and interest in delivering SUEs even in more viability challenged areas (i.e. Gainsborough) |
| East Lindsey | <ul style="list-style-type: none"> - Significant viability challenges across much of the district – viability study references to ‘higher value areas’ is still within the context of relatively low values, albeit target affordable housing requirements are 30-40% (contingent on area) - Significant flood risk challenges in the coastal zone with majority of housing growth directed inland – purposefully avoiding SUEs, with housing growth directed to larger villages and small towns (incremental growth) to deliver homes in the areas where demand from in migrants (typically older people) is - This strategy also reflects the dominance of smaller, local housebuilders which dominate the market and are a key source of local employment – would be less likely to compete/deliver SUEs so smaller sites suit their strengths |
| South Kesteven | <ul style="list-style-type: none"> - Growth principally focused around towns of Grantham and Stamford - More challenging viability around Grantham in the north of the district, less constrained in higher value areas in the south of the district - C. 30% on-site affordable housing targets, subject to viability and site-specific constraints etc - Flood risk less of a constraint |
| North East Lincolnshire | <ul style="list-style-type: none"> - Growth principally focused around Grimsby and Cleethorpes (c. 65%) with the ‘arc’ around Grimsby being a further key growth location (c. 30-35%) |

| Local Plan area | Key characteristics |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <ul style="list-style-type: none"> - The greatest affordable housing need clustered around Grimsby – which coincides with the lowest values and greatest viability challenge. - Affordable housing targets for on-site delivery are commensurately low at c. 10% for many areas - Flood risk is a significant challenge particularly in coastal locations (including much of Grimsby and Cleethorpes) |
| North Lincolnshire | <ul style="list-style-type: none"> - Significant growth proposed around Scunthorpe – a predominantly lower value area and a sub-regional centre - Viability is a significant challenge with proportionately low on-site affordable housing policy requirements (often <10%) - Significant flood risk – often associated with rivers – across much of the Local Plan area |

Source: SQW analysis of adopted Local Plans and supporting Whole Plan Viability Assessments for all local planning authorities

4.19 The diagram below illustrates the locations of all of the allocated SUEs of 1,000+ homes across Greater Lincolnshire, which clearly illustrates the distribution of the largest , principally in the west and north of the County, with additional clusters around Boston.

Figure 4-6: Distribution of SUE allocations (1,000+ homes only) across Greater Lincolnshire



Source: SQW analysis

Key developers and housebuilders

- 4.20** Homes are delivered across Greater Lincolnshire by a mix of large-scale national (volume) housebuilders, regional and local housebuilders and developers. What makes Greater Lincolnshire relatively distinctive is that housing delivery is dominated to a greater extent by smaller, more locally based housebuilders, reflecting a number of factors including challenging viability, the rural geography of much of the county and prevalence of small and medium-scale residential site allocations.
- 4.21** Key volume housebuilders active in Greater Lincolnshire include **Persimmon, Taylor Wimpey, Barratt Homes, Gleeson Homes and Bellway Homes**. None of these housebuilders has a regional office in Lincolnshire and operate out of other regional offices (i.e. Nottingham, Yorkshire, Cambridgeshire etc).
- 4.22** Anecdotally consultees with local authorities indicated that whilst the delivery by larger volume housebuilders is increasing across Greater Lincolnshire, there is still significant geographic variation here: East Lindsey's Local Plan acknowledges this in proactively allocating smaller sites better suited to delivery by the smaller, local housebuilders which are active in this locality, noting that larger housebuilders typically do not deliver significant numbers of homes in this locality.
- 4.23** A small number of these national housebuilders were approached to participate in this study through contacts provided by the client group; none of those approached were able or willing to participate.
- 4.24** Many of these national housebuilders are piloting and innovating off-site construction techniques and systems, with some selected examples below:
- i) **Barratt Homes** – Barratt Homes utilises a range of off-site manufacturing methods and systems including timber frames, roof cassettes, offsite ground floor systems, light gauge steel frames, large format blockwork and offsite garage manufacture. For example, Barratt Homes have delivered a number of homes using the SIG I-House system, incorporating H+H Celcon Elements (a large format aircrete block) which facilitates homes being made watertight in less than 2 weeks compared with 8-weeks for a typical, traditionally constructed home¹¹⁶. It is understood, following consultation with North East Lincolnshire Council, that Barratt Homes are utilising a panellised construction system to deliver a scheme at New Waltham (Grimsby).
 - ii) **Persimmon** – within the Persimmon group of companies is 'Space4', a manufacturing business which manufactures offsite timber frames, insulated wall panels and roof cassettes to improve site productivity¹¹⁷.

¹¹⁶ Case Study: Using the SIG -House System, Barrattdevelopments.co.uk – Accessed [Here](#)

¹¹⁷ Persimmon Homes: Space 4, Accessed [Here](#)

iii) **Bellway** – rather than innovating its own MMC systems or products, Bellway has adopted a partnership approach. As an example, Bellway is partnering with ilke Homes to deliver 40 modular homes on a site it is delivering in Milton Keynes, whilst also delivering another 160 homes using steel and timber framed systems (a split between open and closed panel systems – partnering with Stewart Milne Timber Systems to deliver these)¹¹⁸. This is a pilot project on land owned by Homes England, who imposed restrictions during the disposal process requiring bidding parties to commit to delivering a proportion of homes utilising MMC.

4.25 None of the large housebuilders are utilising offsite manufacturing systems or technologies that are manufactured in Greater Lincolnshire.

4.26 There are a number of smaller housebuilders and developers operating in Greater Lincolnshire which are particularly important both in terms of delivering homes and as local employers. These include **Broadgate Homes, Chestnut Homes, Lindum Homes, Keigar Homes, Carr and Carr, Ashwood Homes, Rippon Homes and Somersby Homes**. This is only a small selection – and not exhaustive. It is understood that most of these developers are delivering homes using relatively traditional methods of construction – albeit this will include the use of some components manufactured offsite (i.e. roof trusses) with relatively minimal engagement with delivery via MMC.

4.27 A small number of locally active housebuilders were consulted with as part of this study. None of them reported utilising Category 1 or 2 MMC systems, noting that they either utilised timber frame or traditional construction methods. Whilst aware of MMC systems, their view was that these were too expensive and not viable on the schemes they deliver. However they also noted that they were already struggling to work out how they will be able to achieve the Future Homes Standard using their current construction techniques – with the 2022 Building Regulation updates also proving challenging already – and that this legislative driver will be a significant obstacle for their businesses. It was also noted that the speed advantages of MMC systems add little in a Greater Lincolnshire context where sales rates are typically relatively. The advantage of timber frame systems was also noted from the perspective of cost efficiencies with the use of trades on-site versus standard traditional construction methods.

4.28 There are examples of developers operating in Greater Lincolnshire with experience utilising MMC products. For example, **Positive Homes** (based in the East Midlands) partnered with ilke Homes, using their volumetric system, to delivery nine zero carbon homes in Newark (Nottinghamshire). Positive Homes are on-site delivering two eco-homes in North Hykeham, Lincolnshire, and whilst they are not utilising a modular system, they are utilising a range of MMC techniques and systems (i.e. utilising expanded polystyrene foam formwork system for the foundations which results in significant time and waste savings),

¹¹⁸ Bellway selects ilke Homes for first MMC development, Infrastructure Intelligence, 7 February 2022 – Accessed [Here](#)

4.29 A case study is provided below of a recent Positive Homes development in the East Midlands demonstrating the feasibility of delivering volumetric homes on a small site.

Case Study 3: Positive Homes – Category 1 MMC delivery on a small site

Positive Homes has illustrated that Category 1 volumetric Modern Methods of Construction (MMC) can be achievable on small sites with the delivery of nine energy efficient homes in Newark-on-Trent. Positive Homes is a small, low-volume (“SME”) housebuilder operating in the East Midlands. The company was founded in 2014 and the Fernwood scheme was the company’s fourth and largest development. The company’s values are centred around building high-quality, energy efficient, yet affordable homes, and they are proponents of the “Passivhaus” standard¹¹⁹ which requires limited energy for heating or cooling.

Key scheme details

Location: Newark-on-Trent

Site area: 0.2 ha

Homes: Nine 3-bed terraced homes

MMC Category: Category 1 - 18 volumetric pods (one per storey) fully pre-installed and installed on site

EPC Rating: A

Energy efficient technology used: combination of high levels of insulation, Mechanical Ventilation Heat Recovery (MHVR) systems¹²⁰ and solar Photo Voltaic¹²¹ (PV) panels.



Source: Dice Consulting

Delivery model

Positive Homes managed the construction works as lead developer utilising ilke Homes modular system. Development finance was provided by Homes England via the Home Building Fund. One of the key challenges overcome was the use of mechanisms to provide guarantees to funders during the manufacturing process – which requires significant upfront funds – to protect against the risk of manufacturing insolvencies. This was a successful ‘test case’ for Homes England and led to Positive Homes to win Private Development of the Year at the 2021 Off-Site Construction Awards.

Project Milestones



4.30 As a high-level overview of housing delivery in Greater Lincolnshire, there is relatively little engagement with MMC – in terms of modular or panellised systems – by either the larger or smaller housebuilders delivering market homes. To some extent traditional construction methods have typically incorporated the use of some structural or non-structural components which are manufactured off-site anyway – roof trusses being an obvious example – but in terms of higher PMV technologies and systems there are relatively few examples of these being deployed or piloted by market-focused housebuilders at any scale in Greater Lincolnshire.

Role of local authorities in MMC delivery (market homes)

4.31 The local authorities comprising the client group are not all engaged in the delivery of homes either for market rent or sale. Those that are engaged are typically doing so on a relatively small scale, notwithstanding longer-term ambitions. Engagement with MMC is also currently in its nascency, although there are some examples of where this is occurring in addition to longer-term aspirations, with lessons to be learnt and applied when it comes to developing the Action Plan to be derived from this study:

- i) **North East Lincolnshire Council: enabling and facilitating through funding levers**– whilst the Council is not directly delivering any market homes for rent or sales, it is playing a role in enabling and facilitating the delivery of sites, principally by having successfully secured funding from Homes England’s Accelerated Construction Fund (ACF) ¹²². One of the grant conditions of the ACF requires funded schemes to incorporate modern methods of construction – Sub Assembly (Category 5) and Components (Category 3). The Council is using its ACF allocation to enable and accelerate the delivery of 58 new homes at the former Matthew Humberstone Playing Field site.
- ii) **South Holland District Council (SHDC): direct delivery (small scale)** - SHDC has established Welland Homes, a housing company which it wholly owns. Currently Welland Homes owns 39 market rental homes. The rationale for establishing the company was to increase housing supply to meet demand, to act as a stimulus for change to improve the quality of rented sector accommodation and set standards for good design, in addition to generating longer term revenue streams for the Council. The Council does not have a significant development or delivery pipeline (for either market or affordable homes), with no specific MMC strategy, but it is

^ce

¹²⁰ Mechanical Ventilation Heat Recovery (MHVR) systems utilise a central heat exchanger and a dedicated ventilation system to extract heat from air (whether coming in or going out, depending on the climate), reducing space heating costs.

¹²¹ Photo Voltaic panels convert solar energy into electricity

¹²²

notable that it has delivered some of the homes within Welland Homes' ownership using timber frame systems as opposed to fully traditional methods.

- iii) **City of Lincoln Council: direct delivery (small and large scale); skills and training partnerships**– The Council has not currently delivered homes using MMC but it does have an in-house development delivery team responsible for unlocking delivery of mixed-tenure schemes on land the Council owns. In this context the Council is open to exploring the potential advantages of utilising MMC systems. Additionally, the Council owns significant landholdings which form part of the proposed Western Growth Corridor SUE. It is proposing using its position as landowner and master developer to promote the delivery of plots / phases by housebuilders / developers utilising MMC, and is looking at exploring the opportunities for developing skills partnerships with local FE providers to facilitate this.
- iv) **North Kesteven District Council Passivhaus Council homes** – North Kesteven District Council recently contracted with Lindum Group to deliver 8 Passivehaus homes in Potterhanworth – the homes were completed in the summer of 2022. It is noted that the homes cost more and took longer to deliver compared with traditional construction techniques, but will result in significantly reduced operational costs for Council tenants. It is also notable that Lindum Group – who are active in delivering homes across Greater Lincolnshire – have developed a sustainable affordable housing products (TradHaus) which can be Future Homes Standard or net zero compliant, which can be delivered both by traditional (brick and block) and MMC methods (time frame, SIPS panels and CLT), which can also be procured via frameworks including Scape and Pagabo.

Overview of affordable housing provision and delivery

- 4.32** The intention here is not to provide a comprehensive or detailed overview of the affordable housing landscape of Greater Lincolnshire, rather to identify key characteristics and trends relevant to the delivery of new homes by MMC.
- 4.33** Affordable housing ownership and delivery across Greater Lincolnshire is a patchwork of local authorities with a functioning Housing Revenue Account holding stock, and delivering new affordable homes, in addition to other areas where local authorities don't hold stock and instead Registered Providers are the principal stockholder and delivery vehicle for new homes.
- 4.34** Stock holding authorities include the City of Lincoln Council and North Kesteven District Council; authorities without an HRA include East Lindsey, South Holland, Boston and North East Lincolnshire Councils.
- 4.35** Where Councils do not own or deliver affordable housing stock the key organisations are Registered Providers (e.g. Platform Housing Group, Acis, Longhurst etc) who own, manage

and deliver new housing stock (as well as acquiring homes delivered by developers via the S106 process). Even in areas where local authorities hold and own stock, Registered Providers are often present (i.e. Longhurst Housing Association in the City of Lincoln) and often work in partnership with local authorities to unlock the delivery of new affordable homes.

4.36 For all affordable housing stock holders – whether local authority or Registered Providers – there are a number of key constraints and challenges which are impacting their capacity to deliver new affordable homes, and the nature of the homes they deliver. Key drivers include:

- i) **Future Homes Standard** – the introduction of the FSH in 2025 will require all new homes built from 2025 to produce 75-80% less carbon emissions;
- ii) **Social rent caps** – the Government has recently consulted the housing sector on introducing proposed caps on social rented housing for the coming financial year (options for 3%, 5% and 7% are being considered). Restrictions on rental levels will limit revenue streams in the context of increasing costs, and limit restrictions for borrowing to fund capital investment.
- iii) **Retrofit and decarbonisation** – the UK Government has legislated for the UK to reach net zero carbon emissions by 2050, with the retrofit of housing stock a key priority.
- iv) **Fuel poverty** – increasing energy costs are increasing the risk of fuel poverty for many affordable housing occupier, increasing the importance for landlords of increasing energy efficiency for existing stock and in new homes.
- v) **Homes England funding conditions promoting MMC** – Homes England’s principal grant funding programme for affordable housing (the Affordable Housing Programme 21-26) includes incentives for additional funding where homes are delivering using MMC (with a focus on Category 1 and 2 systems). This is a key driver and incentive for Registered Providers in particular seeking to deliver new homes using MMC.

4.37 In a Greater Lincolnshire context some of the earliest adopters of MMC technologies and systems have been organisations involved in the delivery of affordable homes, with Homes England’s strategic objectives and recent funding incentives being particularly key drivers. Two case studies from across Greater Lincolnshire are illustrated below.

Case Study 4: South Kesteven District Council affordable housing MMC delivery – G F Tomlinson (contractor) and Premier Modular (MMC system)

The first modular housing scheme in South Kesteven, Grantham was completed in 2020. The scheme comprised two developments of affordable housing in Earlesfield Lane (planning app: [s19/0027](#)) and Kinoulton Court (planning app: [s19/0026](#)), SKDC being the freeholders of this parcel of land off Earlesfield Lane, Grantham. Kinoulton Court is a 5,400 sq. ft. housing development comprising 10 one-bedroom apartments split into two. Earlesfield Lane comprises 2,200 sq. ft of four one- bedroom semi detached apartments.

Planning permission was granted with the buildings being designed as a modern interpretation of a traditional dwelling type including a pitched roof and brick facing materials. The total project value was £2.1m with an 88% local spend within 40 miles of Grantham.

G F Tomlinson, a Derby based construction firm was procured through the SCAPE construction framework with locally led architects, MikeDaubney Architects, utilising a modular system provided by Premier Modular Ltd (based in Drifffield, Yorkshire).

Modular homes construction timeline:

- Premier Modular Ltd appointed as the offsite modular building specialists.
- Construction commenced late 2019 with full enabling groundworks package for each plot with foundations, drainage and a protective ground gas membrane.
- Delivered by lorry to site, the houses were fitted onto prepared foundations which include functioning pipe works and electrics. This saved 10 weeks of construction time when compared to traditional methods.
- Homes were roofed and cladded on site, before external works were undertaken to each property.
- The traditional timber truss roofs and slate tiling was completed on site due to restrictions with transporting overly large modular building sections through the narrow residential streets.

- External elevations were fitted with insulation and brick slips, and all internal finishes were completed by Premier Modular Ltd including UPVC glazing, mechanical and electrical works, plastering, decorations, flooring and commissioning.



(Kinoulton Court Design and Access Statement, 2018)
(Earlesfield D&A Statement, 2018)

Case Study 5: Platform Housing & Burmor Construction MMC affordable housing delivery – London Road, Kirton (Boston District Council)

Platform Housing is one of the largest Registered Provider and Landlords in the Midlands with a total stock of 46,000 homes. In Greater Lincolnshire, their presence is significant with a stock hold of over 7,900 homes in East Lindsey and approximately 750 units in the Boston area¹²³. Platform has entered into a Strategic Partnership with Homes England as part of the current Affordable Housing Programme (21-26) with grant incentives in place to deliver 25% of new homes using MMC.

London Road, Kirton

Platform Homes are partnering with an established SME MMC contractor which specialises in social housing, Burmor Construction, to deliver 41 MMC Category 2 (timber panellised) affordable homes. The scheme is fully affordable with a mix of social rented and shared ownership units across 1Bed, 2Bed and 3Bed terraced and semi-detached house types.

A planning application was submitted in August 2020 and granted December 2020 with conditions attached. Practical completion is estimated for 2023.

MMC Technology

35 of the homes will be built using Green Square Accord's MMC manufacturing subsidiary LoCaL Homes Eco100 system, which is an off-site, timber framed panelised system. 6 of the dwellings will be built using a new material from Durisol UK, who use 'woodcrete' insulated concrete framework blocks. Platform Housing are also partnering with Birmingham City University to monitor and evaluate the energy performance of the homes once occupied.



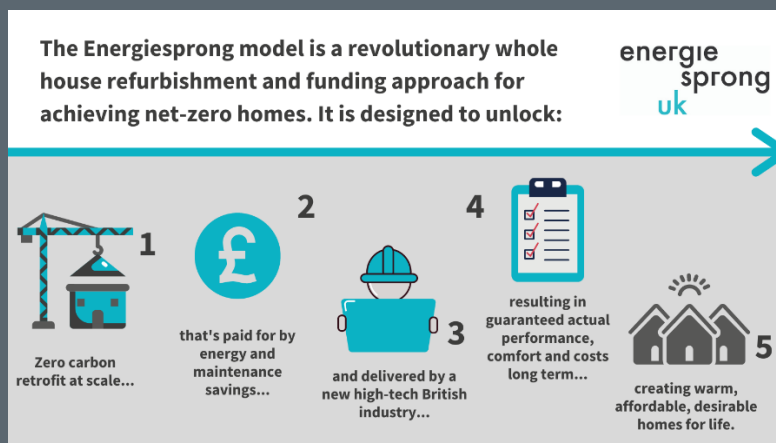
¹²³ Consultation with Platform Housing

Retrofit

4.38 The importance of the retrofit agenda, particularly for existing holders of affordable housing stock, and the potential interface with the MMC agenda is also worth acknowledging. The tension between the feasibility and potential advantages of retrofitting existing properties, particularly from an embodied carbon perspective, set against the financial viability of retrofit compared with demolition and new build is frequently challenging, and one which affordable housing stock owners are grappling with. Significant innovation is occurring in the retrofit space, particularly from an MMC perspective, and a case study is provided below of a retrofit MMC system which works at this interface.

Case Study 6: MMC retrofit system – Energiesprong UK

Energiesprong UK is building on a retrofit system and funding mechanism first developed in the Netherlands. The basic principle is that existing homes can be fully insulated using offsite manufactured wall and roof panels in conjunction with pre-assembled 'energy pods'. The enhanced energy efficiency of the homes is then financed by the longer term energy and maintenance savings.



The first pilot scheme in the UK was undertaken (2017) by Nottingham City Homes, by the contractor Melius Homes. The Energiesprong solution was procured based on a fixed price, evaluating instead the whole life cost and the design quality. Prefabricated off-site, wall panels arrived in 'full storey heights' complete with ample insulation, double glazed windows and a durable board finish, ready to crane into place. Tenants were able to remain in residence throughout the retrofit, which was completed in one week.

Source: [www. https://www.energiesprong.uk/](https://www.energiesprong.uk/)

Consultation feedback

4.39 Consultations were undertaken with a selection of local authorities, Registered Providers, contractors, developers and housebuilders involved with housing delivery – both market and affordable housing – across Greater Lincolnshire. A summary is provided below of the key points of feedback:

- **MMC costs remain challenging for housebuilders and developers**– the costs of delivering using MMC are considered to represent a significant barrier particularly in the delivery of housing in the market tenures. The frequently relatively small scale of housing sites in Greater Lincolnshire makes it challenging to achieve the economies of scale required to make some of the principal volumetric and panellised systems viable on a per unit basis. Housebuilders and developers active in Greater Lincolnshire have tried and tested cost models, contractor / sub-contractor relationships and supply chains based on traditional construction methodologies. Testing MMC systems is considered risky and not financially viable in many instances.
- **The Future Homes Standard is posing a challenge for housebuilders using traditional methods** – whilst the standard is not yet applicable, some consultees expressed concern at their current traditional and timber frame systems being unable to achieve these exacting future standards within the current cost parameters.
- **The affordable housing sector is an early adopter and key driver of MMC** – this is driven to a significant extent by affordable housing funding conditions being imposed by Homes England which is incentivising affordable housing delivery.
- **Local authorities are beginning to use a number of levers and mechanisms to catalyse the delivery of MMC** – these include direct delivery and use of MMC technologies, using strategic land ownership and disposal conditions tying developers to using MMC, and imposing conditions through funding secured and invested in enabling schemes.
- **Sustainability rather than cost efficiencies often the ‘USP’ for MMC** – when the MMC sector was in its infancy, the potential cost savings were a key ‘selling point’; in reality these are challenging to deliver compared with traditional construction, particularly on smaller sites. Instead, many MMC manufacturers are positioning their products as sustainable – low-waste, Future Homes Standard / net zero ready, low operational energy costs, reduced pollution associated with construction vehicle movements etc – and this is a particular selling point for Registered Providers and affordable housing stockholders who are thinking medium/long-term about the sustainability of their assets, more so than developers building homes for sale. Registered Providers are also taking into account the longer-term performance of MMC-built homes from a lifecycle costs perspective when making investment decisions, in addition to consideration of the implications of highly energy efficient homes in reducing energy bills for affordable housing tenants at a time of acute concern over rising energy costs.

- **Some smaller developers are willing to innovate and engage with MMC** – there is evidence that some smaller developers / housebuilders operating in and adjacent to Greater Lincolnshire are beginning to innovate and position themselves at the forefront of delivering sustainable homes using innovative construction methods, including MMC systems. This segment of the market is in its infancy, but is growing – and interestingly appears to be being led by developers principally based in the East Midlands but also operational in Greater Lincolnshire.
- **Some smaller (local / regional) contractors are pivoting into delivering using MMC** – there is evidence of smaller contractors who are positioning themselves as MMC ‘experts’ having recognised the opportunity there is, particularly the affordable housing sector. These contractors have been willing to innovate and take a financial ‘hit’ on early projects utilising MMC systems to build their experience, credibility and understanding of specific systems. Stakeholder feedback from one of these contractors emphasised the importance of (a) how they built a partnership with a manufacturer which has led to repeated use of their system across multiple sites, building experience within the contractor’s supply chain and providing the opportunity to give feedback to the manufacturer (b) utilising a system which can be installed using the contractor’s existing sub-contractor team(s) with transferable skills and (c) how they proactively promote the use of MMC as a solution to delivering specific sites, not necessarily waiting for the procuring client to suggest MMC.
- **The interface between MMC manufacturer and contractor can be challenging** – this is a consequence of the departure from traditional on-site assembly and the shift towards the installation of precision engineered manufactured products in a construction site setting and the implications this has for manufacturer warranties, sub-structure tolerances etc. The experience of stakeholders consulted shows that it is important for manufacturers and contractors (where the manufacturers aren’t providing a turnkey service) to build genuine partnerships to ensure mutual understanding and feedback for both stakeholders and share learning – as well as to contribute towards R&D and product development.
- **Local authorities and Registered Providers have access to, and have used, frameworks to procure and deliver homes using MMC at a relatively small scale. Engagement and awareness of these frameworks is patchy** – this includes LHC, Pagabo and Procure Partnerships. For example, LHC has an off-site manufacturing framework, however this is relatively underutilised as it only includes manufacturers and is separate to its contractor frameworks. LHC is addressing this disconnect and is proposing to launch a framework which will pair manufacturers with potential contractor partners to provide a ‘full’ solution for procuring bodies.
- **There is very little information sharing between organisations engaged in the delivery of MMC in Greater Lincolnshire...but there is significant appetite to share experiences and lessons learnt** – all stakeholders recognised the nascency of the MMC

sector but its potential importance in the future of housing delivery. However, key barriers include negative perceptions, outdated or inaccurate understanding of different systems and technologies and a lack of access to information. Almost all stakeholders are enthusiastic to engage and participate in information sharing to overcome these barriers.

- **There is significant local authority appetite and interest in MMC...**but resources are often constrained and competing priorities of achieving value for money and delivering sustainable outcomes need to be balanced – this is also in the context of a highly variable landscape of strategic priorities (i.e. some authorities have sustainability and/or ‘forward thinking’ housing strategies, others don’t) and variable understanding and perceptions amongst Members and the general public of the benefits and risks / opportunities posed by MMC system and technologies. Again, information sharing is key.
- **Retrofit is as much a concern as new build** – this is particularly the case for stock holding authorities and Registered Providers. The interface between MMC systems / technologies and retrofit programmes is of particular interest (i.e. insulated external cladding systems, energy efficient renewable systems, low-water use bathroom pods etc).

Demand-side review – key conclusions

4.40 An overview of our key conclusions of this demand-side review is provided below:

Demand-side review – key conclusions

- Forecast demand for housing for Greater Lincolnshire (including relevant Housing Market Areas) is aggregated at c. 4,500 – 5,500 homes per annum for the next 10+ years.
- In recent years Greater Lincolnshire’s local authorities have exceeded required housing need and over-delivered (as per the UK Government’s Housing Delivery Test).
- Whilst the majority of Greater Lincolnshire’s housing allocations are for small sites (<25 homes), the majority of new homes will be delivered on a relatively small number of sites allocated for >1,000 homes as part of SUEs in close proximity to key locations including Lincoln, Scunthorpe, Grimsby, Grantham, Gainsborough, Boston and Sleaford.
- Viability is a key delivery challenge across much of Greater Lincolnshire with particular challenges in lower value urban (and growth) locations such as Grimsby, Scunthorpe, Boston and Gainsborough.

- Flood risk is a major challenge for much of the county, particularly in coastal locations (Boston, East Lindsey, Grimsby) and areas close to rivers (including much of North Lincolnshire) – flood mitigation is acknowledged in many places as a key abnormal cost which negatively influences the viability of new development.
- Strategic infrastructure delivery is recognised as a key challenge for the viability and deliverability of major SUEs across Greater Lincolnshire, requiring a range of responses in different contexts including Homes England funding, phasing of infrastructure contributions and lower affordable housing targets.
- There is very little evidence of the use of MMC – focusing on volumetric and panelised systems (Categories 1 and 2) – by larger housebuilders and developers in Greater Lincolnshire delivering market housing.
- Registered Providers are at the forefront of MMC delivery in Greater Lincolnshire in the context of affordable housing. Homes England funding conditions and levers are a key driver of engagement with MMC.
- Local authorities across Greater Lincolnshire – albeit on a small scale and with activity highly variable – are also engaging with MMC in a number of ways. This includes direct delivery (typically small scale), enabling development through accessing Homes England funding which is conditional on requiring developers to deliver using MMC, and using strategic land ownership as a potential lever to catalyse MMC delivery.
- There is evidence that smaller contractors with a local / regional presence are pivoting into the MMC space ahead of larger contractors, demonstrating versatility and agility where larger contractors are perhaps more ‘fixed’ in terms of their preferred methods of delivery.
- The retrofit agenda is of particular importance and the interface with MMC is of interest to existing affordable housing stockholders.

5. Conclusions: SWOT analysis and the rationale for intervention

Introduction

- 5.1** This section starts with a SWOT analysis of MMC in a Greater Lincolnshire context based on the key findings from the research presented in the body of this report.
- 5.2** This SWOT analysis will then frame subsequent articulation of the rationale for the local government bodies comprising the client group to intervene in the market with a mix of demand and supply-side interventions to promote the growth of MMC capacity across Greater Lincolnshire.
- 5.3** The report concludes by establishing two of the key components – the context and strategic objectives – of the theory of change which will justify and guide the proposed programme of potential interventions to be encapsulated in a SMART Action Plan to be developed during the next stage of the study.

SWOT analysis

- 5.4** This SWOT analysis is deliberately high-level and does not seek to repeat the detailed conclusions reached in the preceding sections of this study; instead, the key findings are synthesised to distil the principal potential opportunities for intervention.
- 5.5** It should also be noted that at the point of preparing the Action Plan itself links and cross-references will be made, where relevant, to detailed research findings and conclusions where relevant; this SWOT is deliberately high-level to bring a structure to the findings of this research.

MMC in a Greater Lincolnshire context: Strengths

- Existing productive housebuilding sector – generally building enough to meet housing need at County level
- Strong network of SMEs in the construction sector
- Some evidence of engagement with MMC by contractors, housebuilders, local authorities, and Registered Providers
- Relative proximity of the western part of the county to the national road network to facilitate logistical connectivity to existing MMC manufacturers
- Proximity of major housing growth locations adjacent to major road network
- Engaged FE and HE institutions with an interest in supporting MMC
- Availability of employment and residential land – including large-scale SUEs
- Freeport status in the north of the county; investment and opportunities around the Port of Boston
- Prevalent housing typologies are typically houses – terraces, semis, detached
- Strong manufacturing and logistics sectors (with sub-sector specialisms) with potential for transferable skills

MMC in a Greater Lincolnshire context: Weaknesses

- A recognition that housing delivery relative to need is variable across the county – even if delivery is strong in aggregate – and there are areas of under-supply
- Relative lack of larger housebuilders or developers at the forefront of MMC operating in Greater Lincolnshire
- Significant financial viability and deliverability challenges – low values, flood risk, rural economy, infrastructure delivery
- Predominance of small residential pipeline sites being delivered by SMEs which can be challenging for MMC system viability, particularly volumetric and panellised systems which require economies of scale
- A very traditional construction sector in the county dominated by SMEs which often have sensitive margins of profitability
- Potentially too close to existing MMC factories / facilities to warrant expansion of these manufacturers into Greater Lincolnshire
- Variable levels of affordable housing need across Greater Lincolnshire and challenging viability model associated with new build affordable homes in many areas – more of a focus on retrofit perhaps than new build (not necessarily a bad thing – but impact on MMC pipeline potential)
- Challenging cost model of FE and HE skills delivery makes it challenging to diversify course provision
- Relative lack of information sharing and joint working between those organisations in Greater Lincolnshire – public, private and third sector – which are either engaging in, or wanting to engage in, MMC.

MMC in a Greater Lincolnshire context: Opportunities

- Homes England funding is driving the MMC agenda, particularly as a condition of affordable housing grant funding for local authorities and Registered Providers
- There is evidence in Greater Lincolnshire of local authorities, Registered Providers and their contracting supply chains of being at the forefront of delivering using MMC systems
- There is a significant opportunity for local authorities with significant land holdings (i.e. City of Lincoln – Western Growth Corridor SUE) to use these as a lever to generate demand for MMC
- Sustainability / net zero policy and legislation on the horizon which will drive an emphasis on building performance – private sector housebuilders are recognising the need to respond to this
- There is a diversity of MMC systems, some of which are potentially viable and deliverable in Greater Lincolnshire if sufficient economies of scale can be achieved
- Engaged FE and HE institutions with potential transferability / alignment with Lincolnshire’s Institute of Technology
- An engaged collective local authority client group – opportunity to act collaboratively and at scale
- Potential opportunities associated with devolution of powers and funding responsibility
- Potential opportunities to position MMC within a wider focus on sustainable construction to build a broader, compelling strategic policy case

MMC in a Greater Lincolnshire context: Threats

- Lack of sectoral demand – relative lack of existing appetite or market signals from the construction sector in Greater Lincolnshire could result in a lack of engagement with potential interventions (i.e. FE course provision etc)
- Structural / demographic challenges with the construction labour force both in Greater Lincolnshire and across the UK – declining and ageing labour force
- Lack of funding availability – either private or public – to invest in MMC manufacturing capacity given the risks involved and wider funding constraints
- Negative perceptions of design quality of MMC products might deter local planning authorities and/or housebuilders / developers from piloting MMC systems
- Supply chain volatility – insolvencies are still a significant risk
- Housing crash could potentially impact on housing delivery as a whole – potential impact on resilience / depth of the market and/or capacity to innovate
- Risk of declining construction sector employment in Greater Lincolnshire if there is failure to expand the MMC manufacturing base in the medium-long term

Proposed Theory of Change: Context and Purpose

- 5.6** Synthesising this SWOT analysis and the findings from this study the context and strategic objectives for the proposed programme of interventions are articulated below to form the basis for the 'theory of change' which will provide the framework for the development of a SMART Action Plan.
- 5.7** Importantly, it is acknowledged that there is significant diversity across Greater Lincolnshire. The challenges and opportunities relevant and applicable in Boston, might not be the same for the City of Lincoln. This being said, this study has sought to position its conclusions and recommendations for developing the Action Plan at an aggregated level: fundamentally the advance and development of the MMC sector requires delivery at scale in response to both demand *and* supply side drivers. Given the nascency of the use of MMC systems and products in Greater Lincolnshire, particularly in market housing delivery, and the fragmented extent of awareness and engagement, it will be challenging for isolated interventions solely delivered at the level of individual local authorities to deliver the *step change* required to genuinely drive additional capacity and engagement with MMC across the County.
- 5.8** Clearly not all conclusions and recommendations resulting from this study informing the associated Action Plan will apply to all local authority areas or stakeholder. However, the intention is to provide a framework for action and future implementation which the client group, and related stakeholders, can utilise as an organising agenda and platform for progressing and developing specific interventions in collaboration *with relevant and engaged stakeholders and partners*.

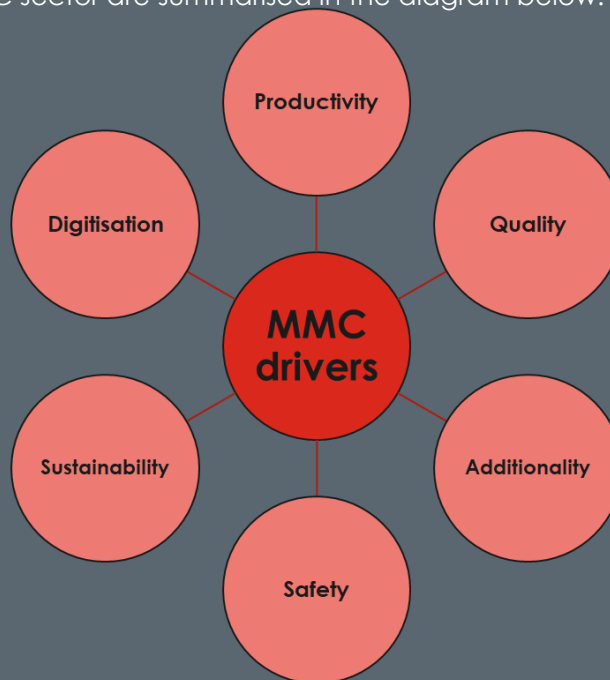
MMC in Greater Lincolnshire Theory of Change: Context

The UK's construction sector faces a number of significant challenges: an ageing and declining workforce, insufficient new and skilled entrants being trained to join the workforce, and stagnating productivity in the context of both a housing crisis and the ever-worsening climate emergency.

Several climate emergency driven legislative drivers will begin to significantly influence housing delivery across the UK: Future Homes Standard in 2025 and the UK Government's 2050 net zero aspirations.

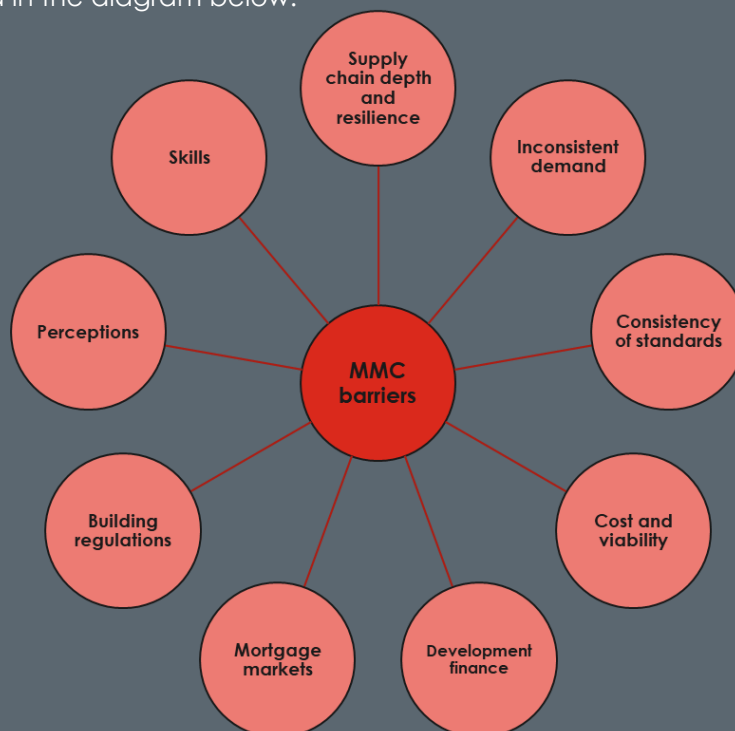
Modern Methods of Construction (MMC) are a policy priority for the UK Government. Utilising off-site manufacturing technologies and systems to deliver homes at scale, more quickly, cheaply and sustainably is the central challenge for the sector, including for Lincolnshire.

Key drivers of the MMC sector are summarised in the diagram below:



MMC in Greater Lincolnshire Theory of Change: Context (cont.)

The MMC sector nationally is still relatively in its nascency and whilst it is growing – with a wide range of products, technologies, manufacturing systems and delivery models in evidence - there remain a number of key barriers to the sector's growth, summarised in the diagram below:



The construction sector in Greater Lincolnshire – inclusive of MMC – is not identified as a strategic economic sectoral priority. Greater Lincolnshire's existing MMC manufacturing base is very limited, with very few manufacturers operating in this space.

Whilst Greater Lincolnshire as a whole is mostly delivering enough homes to meet identified need, there are specific locations where insufficient housing is being delivered.

Housing delivery (highly geographically specific) challenges across Greater Lincolnshire include: challenging market viability, flood risk, significant infrastructure delivery burdens, limited scale of development sites, a dispersed rural geography, the challenges of retrofitting existing stock and the relative undersupply of construction skills. These challenges can be particularly acute for some MMC systems and delivery models... different approaches to the promotion of MMC will be required to account for locational variation

Affordable housing stock holders across Greater Lincolnshire – including local authorities, Registered Providers and their supply chains – are beginning to innovate and deliver schemes utilising MMC in response to Homes England funding and policy requirements.

However, there is relatively little evidence of market housing developers and housebuilders engaging with MMC – with costs of MMC cited as a major factor - particularly with GreaterLincolnshire's construction and housing sector being characterised by relatively traditional SME companies, and a relatively small presence of those national housebuilders which are innovating with MMC.

MMC in Lincolnshire Theory of Change: Rationale for intervention

There is a disconnect between the strategic drivers and challenges identified facing the construction sector and housing delivery and the response of the market – noting that there are funding and legislative drivers already pushing the affordable housing sector to engage.

Housebuilders and their supply chains in Greater Lincolnshire have little to no short-term incentive to change their methods and models of delivering market homes for a range of reasons:

- there is no binding legislative imperative to change on the immediate horizon
- there is insufficient market pressure or demand from the end consumer to drive a change in approach / product
- there is a lack of awareness and understanding within Greater Lincolnshire's housebuilding sector more generally of the potential opportunities associated with a diverse range of MMC products and systems.
- there remain challenges with the feasibility and viability of many MMC products and systems, particularly in the context of the frequently small-scale residential sites delivered using traditional methods by SMEs which characterise Greater Lincolnshire and the significant geographic variation across the County in terms of deliverability and viability – particularly for market housing.

However, legislative drivers are on the horizon in the medium term (i.e. 2025) – particularly focused on sustainability – and the structural challenges affecting the UK's construction sector labour market will be felt ever more acutely in a Greater Lincolnshire context.

Failure to respond to or engage with the legislative and policy drivers focused around the Future Homes Standard and net zero would represent a significant threat to Greater Lincolnshire's housebuilding and construction sector.

The implications for failing to engage – for instance investing in training and skills, the expansion of supply and stimulation of demand - could include a drop-off in the ability of Greater Lincolnshire's housing sector to deliver enough homes to meet demand. This in turn could result in acting as a key constraint for Greater Lincolnshire's future economic growth.

Increasing capacity to deliver new homes using MMC will therefore be key to responding to these drivers – it will be particularly important to support SME developers and contractors which are a key feature of Greater Lincolnshire's residential sector.

MMC in Greater Lincolnshire Theory of Change: Rationale for intervention (cont.)

There is, therefore, a rationale for public intervention to overcome the disconnect between the lack of MMC capacity and engagement in Greater Lincolnshire's housing market due to the barriers identified and the imperative of the identified strategic drivers.

However, recognising that the affordable housing sector is already at the forefront of engaging with MMC in Greater Lincolnshire relative to developers of market housing – albeit still at a relatively early stage – interventions will need to be targeted accordingly, supporting each sector as appropriate relative to the current stage of their engagement.

The delivery of affordable housing using MMC – both by local authorities and Registered Providers – will continue to act as an important stimulus for the sector in Greater Lincolnshire and will be a key driver of demand. This should continue to be supported.

Interventions will also need to account for geographic variation in terms of viability and delivery challenges, and recognise that the timeframes for intervention in these instances may well be much longer term.

The response required will necessitate both demand and supply side interventions in the context of current low levels of engagement and delivery of MMC – this will avoid the 'chicken and egg' scenario.

Encouraging the growth of MMC manufacturing capacity will also be an important part of the strategy to support the future resilience of Greater Lincolnshire's construction sector, recognising that in the medium-long term an increasing proportion of jobs in construction nationally will be factory-based and there is an opportunity for Greater Lincolnshire to participate in the expansion of this sector, and the associated productivity and employment gains, also leveraging the potential for transferable skills between both existing construction sector employees and other manufacturing sectors in Greater Lincolnshire, particularly in the north of the region.

MMC in Greater Lincolnshire Theory of Change: Strategic objectives

Strategic Objective 1: To enhance the scale, resilience and capacity of Greater Lincolnshire's housebuilding sector – both public and private – in the medium-long term through catalysing the increased utilisation of MMC systems and technologies to deliver more homes, more quickly, efficiently, and sustainably.

Strategic Objective 2: To support the expansion of Greater Lincolnshire's MMC manufacturing base and related supply chains to deliver productivity, employment and sustainable outcomes as well as contributing to an increasingly resilient labour market sustaining green jobs for the future.

Strategic Objective 3: To recognise the significant diversity of viability and delivery challenges for housing delivery across Greater Lincolnshire by adopting a nuanced, locationally appropriate approach to promoting MMC which is sensitive to context and particularly attuned to the needs of SMEs operating in this sector: applying an Action Plan flexibly, attuned to locational needs.

Strategic Objective 4: To position Greater Lincolnshire as a pioneer in sustainable construction through its prioritisation as an economic sector as a platform for unlocking the benefits associated with increased engagement with MMC in housing delivery.

Strategic Objective 5: To achieve this through collaborative, multi-stakeholder working across five thematic priority areas addressing both demand and supply side factors:



Annex A: stakeholders consulted

- Homes England
- Positive Homes
- Platform Housing Group
- Acis Group
- Lincoln College Group
- Boston College
- Lincoln University
- Carr & Carr
- Chestnut Homes
- Burmor Construction
- South Holland District Council (delivery)
- City of Lincoln Council (delivery)
- North Kesteven District Council (sustainability)

A.1 NOTE 1 – attempts were made to engage with a number of other developers, housebuilders and Registered Providers active in the Greater Lincolnshire market who did not respond or wish to engage in this study. This included both local, regional and national scale organisations. Approaches were made directly and via the client group. Reasons stated for not engaging included lack of time / capacity, and lack of interest in MMC. Others declined to respond at all.

A.2 NOTE 2 – SQW has been, and is, involved with delivering a number of research and project-specific commissions across the UK involving MMC. This has involved consultation with MMC manufacturers, developers and Registered Providers engaged with the delivery of MMC. The intelligence gained from these consultations has directly informed this study, however the names of these organisations have not been stated as direct consultees in this study as they were not consulted or engaged in this context.

NOTE 3 – the number of consultees (13no.) is in excess of the number stated (10no.) in SQW's RFQ response which provided the basis for this commission. The list is deliberately not intended to be exhaustive within the available budget and scope for this commission, but is intended to be representative and to capture a broad range of organisations with an interest in the MMC agenda across Lincolnshire.

SQW

Contact

For more information:

James Kinnersly

Associate Director, SQW

T: 07708327543

E: jkiddersly@sqw.co.uk

Reuben House
Covent Garden
Cambridge
CB1 2HT

www.sqw.co.uk

About us

SQW Group

SQW and Oxford Innovation are part of SQW Group.

www.sqwgroup.com

SQW

SQW is a leading provider of research, analysis and advice on sustainable economic and social development for public, private and voluntary sector organisations across the UK and internationally. Core services include appraisal, economic impact assessment, and evaluation; demand assessment, feasibility and business planning; economic, social and environmental research and analysis; organisation and partnership development; policy development, strategy, and action planning. In 2019, BBP Regeneration became part of SQW, bringing to the business a RICS-accredited land and property team.

www.sqw.co.uk

Oxford Innovation

Oxford Innovation is a leading operator of business and innovation centres that provide office and laboratory space to companies throughout the UK. The company also provides innovation services to entrepreneurs, including business planning advice, coaching and mentoring. Oxford Innovation also manages investment networks that link investors with entrepreneurs seeking funding from £20,000 to £2m.

www.oxin.co.uk