**The First Home Vision:**

First Home are a team of experienced developers and construction specialists, delivering a completely new concept for lower-cost homes.
Clean, green and space-efficient apartments built using Cross-laminated timber, which provides a quicker, cost-effective building process. First Home have designed the 'Treehaus' apartment, utilising the off-site manufacture of bathroom pods, utility cupboards, and CLT panels to deliver efficient and affordable homes to live in, with far less environmental impact.
During the design process the team has discussed extensively the use of CLT panels, and other modern methods of construction, with key stakeholders of the construction industry, and run a quarterly Modern Methods of Construction forum to openly discuss new ideas and key challenges faced by designers, developers, suppliers and contractors.

**Klas Nilsson, First Home Chairman's Statement:**

*"The housing crisis of today is on a scale we have never seen before. Our ambition is to design and deliver thousands of high quality homes at affordable prices. With 5 decades of prime residential development and having delivered some of the most iconic schemes in London – I wanted to use that experience to enable high quality and exceptional design to be part of today's solution."*

## Committee Question;

### *Perceived advantages of offsite manufacture for construction*

*1. What are the opportunities offered by offsite manufacture for construction? What are the likely drawbacks? What factors are likely to influence clients, architects, design engineers, contractors and the supply chain in deciding whether to choose offsite manufacture?*

*2. It is often claimed that offsite manufacture can lead to:*

*• lower costs, faster delivery and increased quality;*

*• increased productivity;*

*• improved health and safety;*

*• greater provision of new, affordable housing.*
*What is the evidence for this?*

1.1 There are a number of common misconceptions associated with the use of CLT, which are applicable to most modern methods of construction. The perceived drawbacks are generally:

- Longer lead-times to procure goods manufactured off-site
- Coordinated designs are required at the early design stages, which can be more time consuming
- Un-willingness of key stakeholders to adapt and embrace change
- The perception of timber with regards to fire safety
- The risk of using one manufacturer for a contractor
- Lack of flexibility within the design once manufactured components have been ordered
- Design limitations due to transportation constraints

1.2 Having undertaken 24months of Research & Design, First Home have uncovered a number of benefits when designing and building with CLT:

- Ability to meet Part L sustainability building requirements
- Ability to achieve increased air-tightness, enhancing building performance and U-values
- Enhanced wellbeing for occupiers
- Reduced weight of super-structure, which creates the potential to work on constrained sites
- Up to 50% quicker than traditional construction
- Up to 90% less waste compared to traditional construction
- 80% fewer vehicle movements reducing the impact on the environment and the local community.
- Less labor intensive than traditional construction
- Safer working environments
- Quality control and improvement of finishes, due to controlled factory environments
- Precision engineering, with as little as 2mm tolerances on CLT sites
- Less storage of materials on site
- Cost Assurance
- Offsite testing of key plan

1.3 The above provides great financial assurances for investors; design benefits for architects and consultants; improved working conditions for tradesmen and a simplified construction methodology for contractors.

2.1 Sophisticated 4D Building Information Modelling (BIM) software can simulate a traditional construction programme alongside a construction programme using Cross Laminated Timber, and generate the estimated overall reduction in construction programme. Time saved on site reduces overheads and profit, prelims and on-site attendance, thus reducing the overall build cost.

2.2 Live CLT construction sites in London highlight the efficient build process, reduced labour force, and improved site conditions.

2.3 First Home have worked closely with Quantity Surveyor's to create a robust Cost Plan, analysing key comparisons between Traditional Construction and Modern Methods of Construction (predominantly CLT). The reduced weight of CLT alone provides a significant cost saving due to the reduced provisions for pile foundations. Reduced construction costs can be returned to the occupier, making the apartments more affordable without sacrificing quality

2.4 HSE guidelines report that on average 2.2 million working days are lost each year due to workplace accidents and injuries. Off-site manufacture reduces the amount of work undertaken on site, and provides safer environments to work in. Removing the requirement of wet trades on-site provide a cleaner environment to work in, and reduces inaccuracies. Increased quality and quality control of materials is achieved through controlled environment of the factories in which they are built and assembled

2.5 It has been proven that children are more focused, less stressed, and experience less conflicts working within a Timber environment, as shown in a study by the Human Research Institute from 2009. Similar studies have shown that timber buildings provide healthier environments to live in, and that residents are happier and calmer in these buildings where the homes are well

ventilated and have fresher and healthier air quality. Man-made materials such as plastics and concrete used in buildings can emit toxins over time into the environment.

***Committee Question;***

***Potential barriers to wider use of offsite manufacture***

***3. What are the drawbacks to offsite manufacture for construction?***

***4. What re-skilling of the construction workforce is required to facilitate a change to more off-site manufacture for construction?***

***5. Can the benefits of standardisation and factory manufacture be realised without hampering architectural ambition? If so, how?***

***6. What R&D is needed, and by whom, to realise fully the potential benefits of off-site manufacture?***

3.1 The perceived drawbacks to offsite manufacture are outlined in Paragraph 1.1.

4.1 CLT panels are assembled on site by a team of tradesmen, generally with a background in carpentry, following a relatively short period of training in CLT installation. The same tradesman can be utilised to undertake the fit-out of the apartments, providing multi-disciplinary learning in construction. Risk assessment and site logistic roles are also required on site.

4.2 It is First Home's intention to develop the Treehaus Academy, providing the opportunity to reduce the skills shortage and enhance quality through construction and off-site manufacture. To entice the younger generation and existing tradespersons who have left traditional construction, we have to highlight the benefits of working with Cross Laminated Timber and offsite-components:

- Cleaner working environment
- Less exposure to Hazardous Risks such as concrete
- Less noise exposure
- Greater quality of installation
- The opportunity to work within a factory environment and not on a construction site
- Pride in the delivery of quality products

4.3 The high level of engineering when using Cross Laminated Timber and other off-site manufactured products is achieved through the use of "Revitt "or "BIM", and is key to the successful production. This provides a greater appeal for people who have studied engineering to utilise this skill within construction.

4.4 With the new incentive by local authorities and government of the building University Technical Colleges, which are sponsored by the Main Contractors such as BAM / KIER / BAA, can only be beneficial to the Construction Industry and show that there are other facets to the industry, besides working on site.

5.1 Design constraints associated with off-site manufacturing are often due to transportation constraints and limited dimensions. Despite Cross Laminated Timber panels having a maximum transit dimension (2.95m x 16m), the form of the CLT structure when assembled is not limited to orthogonal boxes. Geometric forms, shapes and even curves can be achieved using CLT, provided this is considered in the early design stages. With the use of CLT, the architectural

intent and design can be further expressed through the external façade, detailing, internal finishes and key amenity spaces such as landscaping, roof space and play areas.

5.2 Constructing with CLT panels also lends itself to standardised design, due to the ease of stacking the structure and service risers. Standardisation of design provides a host of benefits during the procurement and construction phases, leading to greater assurance of costs and programme.

6.1 Over the last 24 months, First Home have primarily focused on the Research and Design of CLT construction, working closely with a team of architects and consultants, and engaging with key members of the supply chain to create a robust housing solution which is practical, affordable and leads to reduced energy costs.

6.2 We have a prepared a detailed Cost Plan; 1:1 design details for a Prototype apartment, including the design of the prefabricated utility cupboard and bathroom; a detailed construction programme; and refined construction methodology.

6.3 It is the First Home aspiration to be on-site by 2019, to realise Research & Design undertaken to date. This body of work will be published, using the first live site to highlight key challenges faced during design, procurement and construction, with future recommendations for client's, designers and suppliers interested in CLT construction.

***Government actions***

***7. (If published) does the construction sector deal correctly identify the issues faced by the construction industry and the actions that the Government and other stakeholders need to take to address them? What should it contain/what is missing?***

***8. What changes could be made to public procurement processes to encourage more economically and environmentally sustainable practises in the construction industry and facilitate off-site manufacture?***

7.1 The government and key stake holders need to embrace off-site manufacture, and gain a better understanding of the benefits of Modern methods of Construction. The following could facilitate the change in mind-set towards MMC:

- The government should be assessing the infrastructure required, and in place, for the production of CLT within the UK and assessing the viability of reviving the Scottish forest industry to both increase job opportunities and reduce the carbon footprint required to transport the CLT. This review should extend to other off-site manufacturing.
- The Government need to be further educated on modern methods of construction through forums with the construction partners, as well as delivery and design teams. Only then can they gain an understanding of the key legislative challenges and barriers to the use of modern methods. Through these forums the government will also have a better understanding of the key constraints that Traditional Construction faces in terms of late deliveries, poor weather disruption, and lack of resources on site.
- Reducing constraints through the planning process and embracing modern methods of construction as an alternative construction methodology will enable the faster production of homes, creating great homes and sense of place.
- The building regulations, such as Part L, need to factor in modern methods of construction into their assessment criteria. Local authorities could produce design guidance note that

takes into account off-site manufacturing, which could be created in conjunction with the specialist manufacturers

- There should be specific papers and updates on a regular basis identifying the clear benefits of off-site manufacture
- The release of government / local authority major land sites, and redundant offices, which developers and house builders can purchase, with agreed density and delivery targets which align with the increased speed of construction.

8.1 Changes needed in procurement processes to facilitate the delivery of off-site manufacturing:

- Embracing a collaborative approach towards procurement of Modern Methods of Construction and offsite manufacturing
- Establishing frame work agreements with local authorities and government
- Due to the early design requirements to achieve off-site manufacturer in-line with the delivery programme, key stake holders and developers should understand the benefits of the Construction Management procurement route, and how this can encourage knowledge sharing and lessons learned through design. This procurement approach would be more beneficial and effective than Design & Build where the risk sits with the main contractor, which can lead to conflict through the design team and delivery team.
- As part of the Construction Management procurement route there can be as many as 15 different contracts that can expose developers / Construction Managers to risk of failure through the supply chain. Therefore ensuring that contracts are flexible and financial support is available.

8.2 Despite construction reports, such as the Farmer review, being issued over the last few years, Modern Methods of Construction has still not been fully embraced. The government should be promoting the Modern Methods of Construction supply chain for pushing the boundaries of technology, and providing cleaner and more efficient buildings that are far more sustainable than traditionally built homes.