

**All Party Parliamentary Group for Excellence in the Built Environment - Inquiry into the Quality of
New Build Housing in England**

Submission by Laing O'Rourke

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1) About Laing O'Rourke

1.1 Laing O'Rourke is a UK-based international engineering enterprise and the country's largest privately owned construction firm. We have played a leading role in high-profile construction projects for government and private developers in all sectors, both within the UK and abroad. Some of our most recent projects include the Leadenhall Building, Crossrail and the Olympics.

1.2 We're leading the industry in offsite manufacturing developments and the utilisation of Design for Manufacture and Engineering (DfMA). Our Explore Industrial Park (EIP) in Steetley, Nottinghamshire allows us to assemble complex structures offsite in a controlled 'factory' environment, before delivering them onsite for installation.

1.3 In 2015 Laing O'Rourke announced its intention to proceed with the construction of a new Advanced Manufacturing Facility (AMF) which will be located next to our existing factory. The new facility will revolutionise house building in the UK. It will be three times the size of our current facility with the capacity to manufacture up to 10,000 new homes per annum, alongside other products.

1.4 Our Europe Hub employs 10,378 dedicated members of staff, the majority of which are based throughout the UK, including our head office based in Dartford, Kent. A significant proportion of our operations are based overseas, we operate in Australasia, the Middle East and Canada.

1.5 We enjoy a strong working relationship with UK Government and Parliament. Our CEO Anna Stewart leads on skills for the Construction Leadership Council (CLC), in 2014 she was also appointed as a Government business ambassador, promoting British infrastructure and construction excellence abroad.

2) Executive summary

- 2.1 Laing O'Rourke believes that if the Government is to achieve its overall objective of building more than one million homes in England by 2020, it will have to embrace the benefits offered by offsite manufacturing, DfMA and digital engineering (also known as Building Information Modelling (BIM)). Homes will not only be delivered on site faster, but this technology enables builders to deliver homes that reach new levels of design and build quality.
- 2.2 Using our techniques an overall increase in output will not lead to a reduction in overall build quality. Industry techniques are almost unrecognisable compared to the days of prefabricated homes widely constructed after the Second World War. We recognise that part of the battle is ensuring that stakeholders from across government and industry understand the crucial difference in terms of design and build quality.
- 2.3 In 2014 Laing O'Rourke continued to deliver a number of important accommodation sites using offsite techniques. The William Street Quarter residential development in Barking, London is an excellent example of this work. The development, which comprises of 201 properties, was shortlisted for RIBA's East London Housing Project of the Year and Building Magazine's Housing Project of the Year.
- 2.4 Using these techniques enables Laing O'Rourke to deliver a quality product to the client. In 2014/2015 EIP delivered 98% of products to a 'right first time' standard, significantly in excess of what can be achieved using in-situ techniques.

3) Recommendations

- 3.1 The Government has shown willingness to invest in Britain's offsite manufacturing capabilities. At the next Comprehensive Spending Review divisions within the Department for Business, Innovation and Skills looking at advanced manufacturing and BIM should be protected.
- 3.2 Furthermore, grant mechanisms that support R&D efforts across the industry should be maintained, these ensure Britain's competitiveness and long term economic growth.
- 3.3 Given the benefits of offsite manufacturing in terms of cost, build time, and quality, the Government should look again at requiring a specific proportion of buildings to be constructed using offsite for public sector projects. This goal would be similar to those contained within the Construction 2025 strategy.
- 3.4 More work should be done by the Government to quantify and evaluate the benefits in terms of quality provided by offsite manufacturing.

4) The opportunities afforded by offsite manufacturing and BIM

- 4.1 Since opening in 2009, EIP has been absolutely crucial to the design and manufacture of some of the UK's most important projects, including both the Leadenhall building (2011 – 2014) and Francis Crick Institute (2011 – 2015).
- 4.2 In the accommodation sector Laing O'Rourke has used these techniques to undertake a range of projects for a diverse range of markets. We are in the pre-development design stage, working with L&Q to deliver housing association properties in Tower Hamlets, while also having completed student accommodation for Bath University and the luxury One Hyde Park development in Knightsbridge.
- 4.3 The Elephant Road residential project in inner London is an excellent illustration of the sorts of opportunities that are afforded by offsite manufacturing and BIM. Delivered for Southwark Borough Council and DV4 Eadon Developments UK Ltd almost every structural element will be manufactured offsite – over 8,000 components at EIP alone. This includes 13,000m² of SmartWall, 870 bathroom pods, stairs, landings and hollowcore floors. Prior to the decision to use DfMA it was estimated that the project would take 174 weeks, Laing O'Rourke is delivering it to the same quality within a 133-week schedule.
- 4.4 Laing O'Rourke recognises that digital engineering alone delivers no value. Having the right people and culture is crucial to delivering a quality housing product to the client. Our internal campaign, 'BIM: now it's personal' seeks to ensure that all employees are BIM level 2 compliant on all public-sector projects by 2016. The programme was recognised with the BIM Initiative of the Year prize at the Building Awards 2015.

5) The future of offsite manufacturing in the accommodation sector

- 5.1 This year Laing O'Rourke announced its intention to construct a new Advanced Manufacturing Facility (AMF) next door to the existing factory in Steetley, Nottinghamshire. Part of the new facility is being funded through a £22.1 million grant from the Department for Business Innovation and Skills (BIS), as part of its Advanced Manufacturing Supply Chain Initiative (AMSCI). Furthermore, Laing O'Rourke received a €2.1million (£1.6 million) grant from the European Union in April 2015.
- 5.2 It is estimated that the new facility will have the potential to deliver up to 10,000 new homes per annum, contributing significantly to the Government's target to build 1 million extra homes by 2020 (200,000 per year).
- 5.3 Branded as E5+, Laing O'Rourke's new proposition for the accommodation sector will be focused squarely around the DfMA and offsite manufacturing model. Early prototypes for both an apartment and a house were completed in September and December 2014. Detailed design development is now proceeding at pace with the new modular housing proposition expected to be completed by the end of 2017.
- 5.4 Looking ahead, Laing O'Rourke will seek to drive further developments in the design and manufacture of advanced mechanical and electrical products - building on our current

capability to deliver a high proportion of mechanical, electrical and plumbing (MEP) content through off site manufacturing.

6) Improving the design quality of new homes and ensuring better quality workmanship

6.1 In 2014/2015 EIP delivered 98% of its products to a 'right first time' standard. This is calculated as the number of products produced, minus those that have been rejected for quality or non-conformance.

6.2 This figure is significantly in excess of what can be achieved using traditional in-situ construction and demonstrates the value of two unique delivery strategies, the direct delivery and direct employment model:

6.2.1 Direct delivery - an integrated delivery capability is crucial to ensuring the overall quality of a house building programme. Having central control over people, technologies and processes means that some of the key risks to traditional approaches can be mitigated against. Laing O'Rourke brings these together under one roof, enabling us to have complete control over the product we're delivering.

6.2.2 Direct employment model - Laing O'Rourke also operates a direct employment model which is a key differentiator between us and competitors. This means that we employ and supervise our own labour, it also means we're able to ensure we're training and growing our own people, identifying skills gaps.

6.3 Laing O'Rourke seeks continual advancement in order to drive quality of product. Examples of some of the advancements we've made include:

6.3.1 Visual task sheets and method statements that have been used extensively to help ensure installation quality meet client expectations.

6.3.2 3D modelling and offsite preparation, particularly around many of the delays and quality problems associated with reinforced concrete. Products can now be digitally constructed prior to arriving on site with the risk of error being drastically reduced.

6.3.3 The use of tablet-based devices and similar technologies onsite. Using this, Laing O'Rourke engineers are able to access digital models of building and infrastructure projects, programme schedules, quality assurance controls and project control or status reporting.

6.3.4 Creating an add-in for Microsoft's Navisworks which enables the digital engineering team to combine hundreds of models from six different Building Information Modelling authoring platforms. As a result, when choosing a particular asset, a user can highlight a specific system and interact with it.

6.3.5 Modular platforms with off-the-shelf designs which can significantly enhance build quality control and production automation. These designs are

comprehensively tested prior to manufacture, raising the quality on delivery.

7) Ensuring the effective control and implementation of regulations impacting on the construction of new homes

- 7.1 The Construction Design and Management (CDM) (1994 and updated in 2007) recognises the importance of clients and designers and contractors in the management of health and safety risk.
- 7.2 Laing O'Rourke believes that offsite manufacturing enables regulations to be followed in a more easily controlled environment, where staff can be monitored for non-compliance. For example, the 2003 Health and Safety Executive (HSE) study, entitled 'causal factors in construction accidents', noted that designers and engineers could reduce risk dramatically by reducing the amount of time employees spent on site by introducing "some form of pre-assembly".
- 7.3 Laing O'Rourke expects more rigorous verification and reporting processes to be implemented, for example around carbon emissions. Significant innovation and partnership working between the industry and government will need to be undertaken to ensure these are met.

8) Cutting operational and maintenance costs for the homeowner and improving new home owner experience

- 8.1 Properly delivered asset management can deliver a step change in terms of the information provided to homeowners and property owners. Laing O'Rourke's new accommodation product offers an end-to-end approach in this area.
- 8.2 Digital asset management provides the ability to cut a building's maintenance cost throughout its lifecycle. If a technician is able to predict that a certain element will fail, they'll be able to avoid a more severe outlay to repairing the product down the line.
- 8.3 It can also radically transform the experience of living in a new property, for example by providing advanced data on statistics such as temperature, water pressure or leaks. Looking ahead to the next 10 years, the industry will see significantly more interoperability with cloud based products exemplified by the 'internet of things'.
- 8.4 Our direct delivery model means that industry leading asset management can be embedded in the design and build process from day one. For example, Laing O'Rourke's digital engineering team is creating a model for the 2015 handover of the Francis Crick Institute in London, a complex new 86,000m² medical research facility. This work will see all assets tagged with their respective code for use in a computer-aided asset management system.
- 8.5 At EIP we operate a new type of asset management helpdesk that receives building information in real time. By monitoring a building electronically we can see how a structure is performing and implement a more efficient condition-based maintenance

regime, for its entire lifecycle. For example, Laing O'Rourke will provide this service to seven schools across Yorkshire, for circa 8,000 pupils.

- 8.6 The industry's expectation is that once a building is complete the BIM model is handed over to a client for asset management use. However, ultimately the basic difficulty arises around whether or not the customer has the skill or desire to maintain the building. The responsibility for industry and government is to make the case for employing this technology on new developments.

9) Improving customer service

- 9.1 Laing O'Rourke believes in the importance of gathering and reporting client feedback for individual projects, creating accountability for what's delivered. In 2014/15 the Group undertook its first global client perception study - a first in our industry.
- 9.2 The objective of this is to strengthen our relationships with clients by better understanding what being a 'trusted partner' means to them. Direct interviews help us understand a client's objectives over the next five years and any anticipated challenges. Questions are also based around our operational performance, their perception of our business as a whole and their views of the wider industry.
- 9.3 Laing O'Rourke's Engineering Excellence Group (EnEx.G) sits right at the heart of our overall goal of delivering industry leading projects for our customers.
- 9.4 Bringing together some of the most influential and experienced figures in the industry, EnEx.G provides a range of products to clients and the wider industry. This includes a bespoke consultancy service and research and development function. The overall emphasis is placed firmly on innovation, the group has steered important projects including Elephant Road, 122 Leadenhall Street, London Gateway Port and the Francis Crick Institute.
- 9.5 Ultimately, the service generates goodwill and loyalty from customers, our supply chain, delivery partners, governments and others, including charities and not-for-profit organisations. Furthermore, it allows us to seek out some of the most pressing matters facing our industry, bringing together experts to drive quality in construction.