In association with

INDUSTRY INSIGHTS

Construction Skills Network

Forecasts 2017–2021

GREATER LONDON

About CITB

CITB is the Industrial Training Board (ITB) for the construction industry in Great Britain (England, Scotland and Wales). CITB ensures employers can access the high quality training their workforce needs and supports industry to attract new recruits into successful careers in construction.

Using its evidence base on skills requirements, CITB works with employers to develop standards and qualifications for the skills industry needs now, and in the future. CITB is improving its employer funding to invest in the most needed skills and by making it easier for companies of all sizes to claim grants and support.

About Experian

Experian's Construction Futures team is a leading construction forecasting team in the UK, specialising in the economic analysis of the construction and related industries in the UK and its regions. As such, we have an in-depth understanding of the structure of the construction industry and its drivers of change. The Construction Futures team has collaborated on the Construction Skills Network employment model with the CITB since 2005, manages a monthly survey of contractors' activity as part of the European Commission's harmonised series of business surveys, and a quarterly State-of-Trade survey on behalf of the Federation of Master Builders.

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SUMMARY – GREATER LONDON

The capital's total construction output is forecast to rise by annual average of 2.4% over the next five years. New work is expected to fare better than repair and maintenance (R&M), with annual average growth of 2.9% in the former compared with 1.2% in the latter. Construction employment is anticipated to increase by an average yearly rate of 1.3%, whilst at 0.9% of base 2017 employment, Greater London has one of the lowest annual recruitment requirements (ARR) relative to the size of its construction market.

Growth is expected to focus on the Infrastructure sectors in the short term, by

16%

each

Employment is forecast to grow by

1.3%

a year on average

Greater London has an ARR of

3,870

KEY FINDINGS

Greater London is projected to see annual average growth of 2.4% in total construction output between 2017 and 2021, above the UK average of 1.7%.

Over the short and long run the infrastructure sector is likely to see the highest average yearly increases. There is a number of large schemes that will be taking place over the forecast period such as the £1bn Northern Line Extension scheme, the Thames Tideway Tunnel and High Speed 2 (HS2), keeping output growth buoyant.

With an annual average rise of 5.1% in the five years to 2021, the private housing market is predicted to be the second best performing one. One of the biggest schemes taking place is the Brent Cross and Cricklewood regeneration development, which is expected to contain a large residential element.

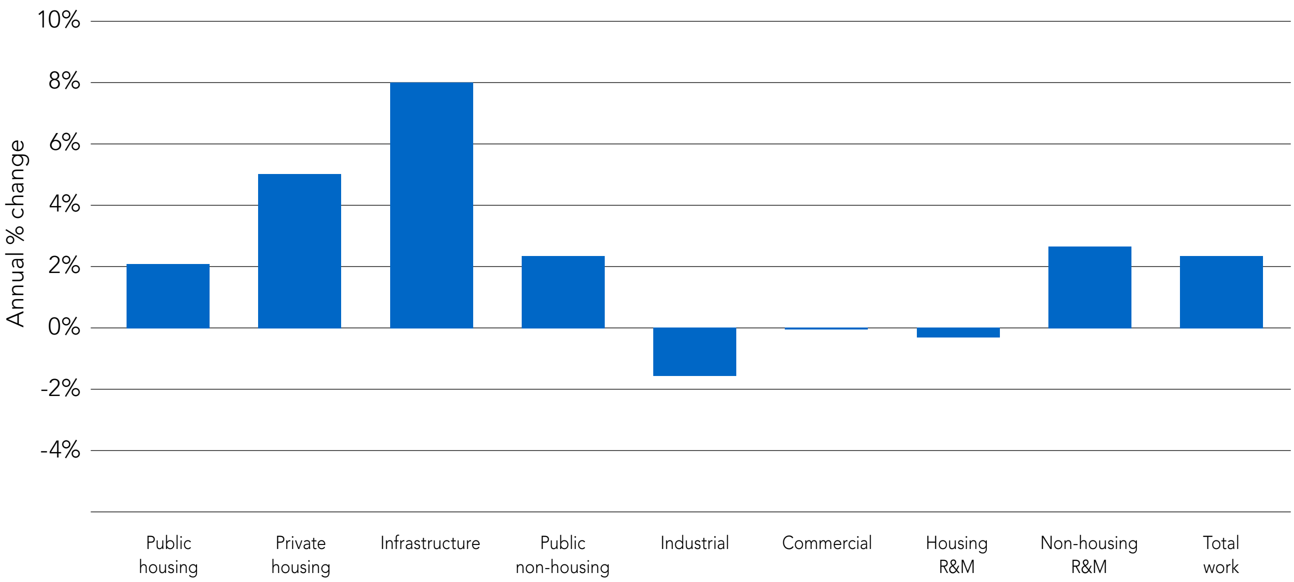
Greater London's commercial sector is predicted to stagnate in output terms over the next five years. Due to its heavy reliance on overseas investors in the London market, this sector is believed to be the most vulnerable to the impact of the referendum vote and it is likely that the biggest impact will be on the offices sub-sector. By contrast, between 2017 and 2021 the UK is expected to see average yearly expansion of 1.2% over the next five years. One of the reasons for this is that outside London the regional offices market tends to be more insulated from global events.

The public housing sector is expected to see average yearly growth of 2.4% over the five years to 2021. The majority of this expansion is likely to come in the next two years as work on University College London's (UCL) new campus begins.

In 2015, the capital accounted for around 15.6% of UK construction employment and this is likely to increase to 16.3% by 2021. Over the next five years construction employment is likely to rise by 1.3% per year on average in Greater London, one of the highest rates compared with other regions and devolved nations and above the UK rate of 0.6%.

At 3,870 extra recruits required per year over the forecast period, the region's ARR is just 0.9% of base 2017 employment, lower than the UK rate of 1.4%. Due to the strong inflow of construction workers that London benefits from, there are only four occupational categories that have an ARR between 2.5% and 5% of base 2017 employment, namely the construction trade supervisors, plant operatives, logistics and civil engineering trades.

ANNUAL AVERAGE CONSTRUCTION OUTPUT GROWTH 2017-2021 – GREATER LONDON



Source: CSN, Experian.
Ref: CSN Explained.

REGIONAL COMPARISON 2017-2021

	Annual average % change in output	Change in total employment	Total ARR
North East	-0.1%	-2,840	1,270
Yorkshire and Humber	0.5%	-1,300	1,860
East Midlands	0.0%	-2,340	1,770
East of England	1.0%	3,230	3,970
Greater London	2.4%	27,110	3,870
South East	2.2%	25,550	3,940
South West	3.1%	8,240	4,180
Wales	6.2%	16,120	3,890
West Midlands	1.3%	4,280	2,800
Northern Ireland	1.6%	1,430	710
North West	2.5%	14,520	5,140
Scotland	-0.4%	-8,420	2,340
UK	**1.7%**	**85,580**	**35,740**

Source: CSN, Experian.
Ref: CSN Explained.

Best performing sector is infrastructure with average yearly growth of 8%.

THE OUTLOOK FOR CONSTRUCTION IN GREATER LONDON

CONSTRUCTION OUTPUT IN GREATER LONDON – OVERVIEW

In 2015, total construction output increased for the second consecutive year, by 4% to £28.86bn, a new high. Whilst the new work sector experienced growth of 5% the repair and maintenance (R&M) one remained flat. Expansion was mainly driven by the private housing, infrastructure and commercial sectors with the former reaching a new high of £5.93bn.

INDUSTRY STRUCTURE

The Construction Industry structure 2015 – UK vs Greater London graphic, illustrates the sector breakdown of construction in Greater London, compared to that in the UK. Effectively, the percentages for each sector illustrate what proportion of total output each sector accounts for.

In 2015, Greater London's new work sector accounted for 69% of total construction output, much higher than the national share of 65%.

The structure of Greater London's construction industry is significantly different from the UK average. At 29% of total construction output, the share of the commercial sector in the capital is much bigger than the UK share (18%) while more emphasis is also placed on the region's private housing market (21% vs 18%). In contrast, at 8%, less importance is placed on the infrastructure one compared to the UK (15%) whilst the regional shares for the other sectors were similar to that of the UK as a whole.

ECONOMIC OVERVIEW

The expected performance of a regional or national economy over the forecast period (2017 – 2021) provides an indication of the construction sectors in which demand is likely to be strongest.

ECONOMIC STRUCTURE

In 2015, gross value added (GVA) in the capital went up for the sixth consecutive year, by 3%, to £362.15bn in 2012 prices.

Once again professional and other private services was the largest sector, accounting for 33.8% of the region's GVA in 2015, whilst the finance and insurance one took the next biggest share, at 14.5%. The public services (13.4%) and information and communication (10.7%) sectors were ranked third and fourth respectively while wholesale and retail was the fifth largest market. Of the top five sectors, the information and communication one experienced the greatest rise of 6.9%.

Greater London has a higher than average exposure to the services sector whilst other sectors such as manufacturing and construction are underrepresented compared to the UK as a whole.

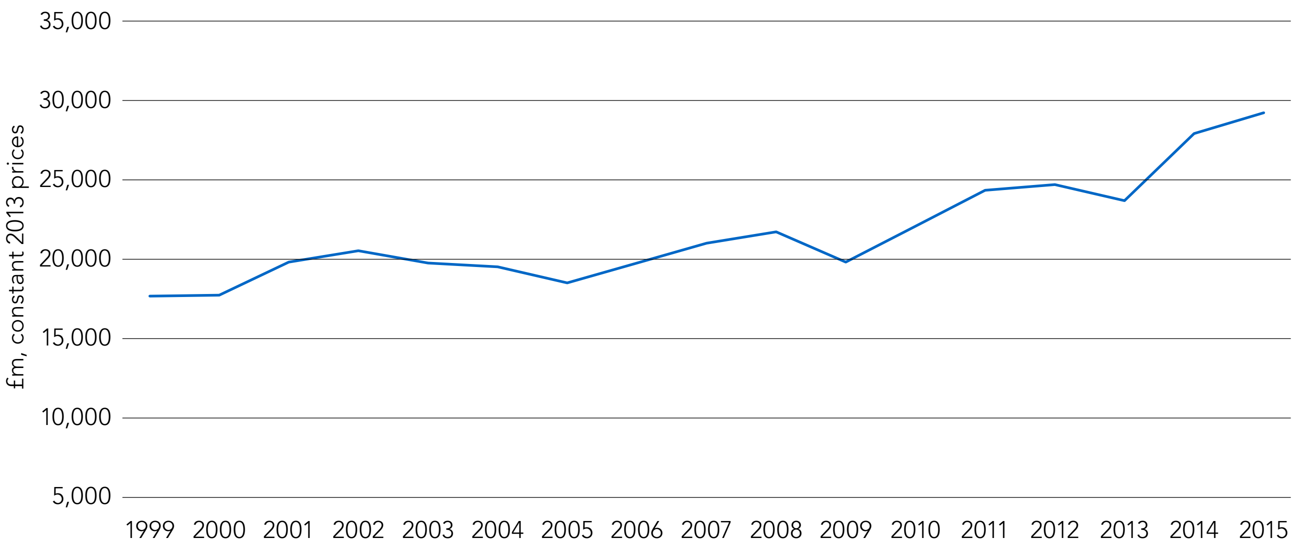
CONSTRUCTION INDUSTRY STRUCTURE 2015 – UK VS GREATER LONDON

	UK	Greater London
Public housing	4%	5%
Infrastructure	15%	8%
Industrial	3%	1%
Housing R&M	18%	16%
Private housing	18%	21%
Public non-housing	7%	5%
Commercial	18%	29%
Non-housing R&M	17%	15%

Source: ONS, Experian.

UK   Greater London

CONSTRUCTION OUTPUT 1999-2015 – GREATER LONDON



Source: ONS.
Ref: CSN Explained.

ECONOMIC STRUCTURE – GREATER LONDON (£ BILLION, 2012 PRICES)

	Actual	Forecast (Annual % change, real terms)					
	2015	2016	2017	2018	2019	2020	2021
Professional & Other Private Services	122.5	2.9	1.8	2.1	2.4	2.9	2.9
Finance & Insurance	52.6	0.9	1.0	1.8	2.3	2.6	3.1
Public Services	48.4	0.6	0.4	1.4	2.1	2.8	2.8
Information & Communication	38.7	6.9	2.7	2.5	2.5	2.7	2.6
Wholesale & Retail	31.0	4.3	1.6	2.0	2.4	2.6	2.6
Total Gross Value Added (GVA)	**362.1**	**2.4**	**1.5**	**2.0**	**2.3**	**2.7**	**2.8**

Note: Top 5 sectors, excluding construction.
Source: Experian.
Ref: CSN Explained.

FORWARD LOOKING ECONOMIC INDICATORS

Over the next five years GVA in the region is projected to grow by an annual average rate of 2.2%, higher than the UK rate of 1.8%. Since 2011, London has held onto the top spot in terms of UK regional GVA growth and looks well placed to continue its reign over the medium term. Risks do lurk in the form of financial regulation, the impact of the referendum vote, housing market shortages and issues of affordability, but despite this, the capital is still likely to outrank the rest of the country based on average GVA growth over the next five years.

Of the top five sectors, information and communication GVA is anticipated to see the strongest average annual expansion of 2.6% whilst the biggest sector, professional and other private services is likely to experience the second highest annual average increase of 2.4%. The weakest of the large sectors is predicted to be public services, rising by 1.9% per annum.

Real household disposable income is expected to rise by an annual average of 1.7% over the forecast period, higher than the UK rate of 1.5%. The capital's working population is expected to continue to grow strongly in the five years to 2021.

Overall, growth across the UK is projected to be slower than predicted a year ago due to increasing global uncertainty. Not just as a result of the European Union referendum result in the UK, but also linked to the recent U.S. elections and continuing instability in the Middle East. London, being a global financial market and attracting the lion's share of foreign direct investment, could be particularly vulnerable to any adverse impacts from these factors.

NEW CONSTRUCTION ORDERS – OVERVIEW

In 2015, total construction orders rose for the third consecutive year, by 9% to £14.75bn – a new high. The infrastructure sector saw the greatest jump of 146% to £2.56bn, probably linked to the letting of contracts for the Thames Tideway project. The industrial market experienced double digit growth of 85% to £421m whilst the public non-residential (£1.62bn) and commercial (£6.07bn) sectors posted increases of 3% and 1% respectively.

NEW CONSTRUCTION ORDERS – CURRENT SITUATION

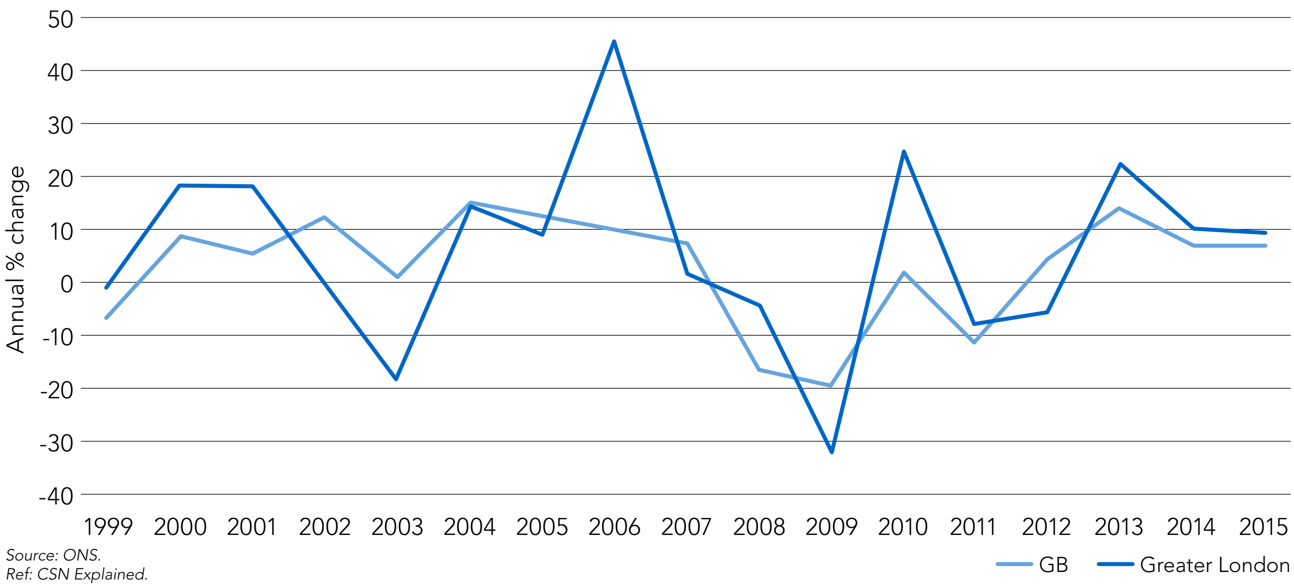
In the first nine months of 2016, all new orders rose by 4% to £10.44bn compared with the corresponding period in the preceding year. The public housing sector recorded the strongest growth of 137% to £686m whilst an increase of 14% was seen in the commercial one (£4.37bn). The private housing (£3.19bn) and public non-residential (£1.07bn) sectors posted expansion of 13% and 3% respectively. In contrast, industrial orders saw a drop of 64% to £137m while a decrease of 41% to £996m was registered in the infrastructure sector.

ECONOMIC INDICATORS – GREATER LONDON (£ BILLION, CURRENT PRICES – UNLESS OTHERWISE STATED)

	Actual	Forecast (Annual % change, real terms)					
	2015	2016	2017	2018	2019	2020	2021
Real household disposable income (2012 prices)	196.2	2.4	0.4	1.8	1.8	2.4	2.3
Household spending (2012 prices)	164.8	3.0	1.9	1.5	2.1	2.7	2.7
Working age population (000s and as % of all)	5,877.5	67.8%	67.8%	67.8%	67.9%	68.2%	68.1%
House prices (£)	425,083	9.3	1.7	2.0	2.9	3.6	3.6
LFS unemployment (millions)	0.3	-1.8	12.7	6.0	5.2	2.6	1.9

Source: ONS, DCLG, Experian.

NEW CONSTRUCTION ORDERS GROWTH 1999-2015 – GREATER LONDON VS GB



Source: ONS.
Ref: CSN Explained.

NEW WORK CONSTRUCTION ORDERS – GREATER LONDON (£ MILLION, CURRENT PRICES)

	Actual	Annual % change				
	2015	2011	2012	2013	2014	2015
Public housing	390	-32.2	-1.6	187.2	-69.2	-30.5
Private housing	3,687	35.3	-15.3	103.5	16.7	-10.2
Infrastructure	2,563	-12.9	26.3	-53.3	-37.2	146.4
Public non-housing	1,621	-39.9	-21.1	31.6	10.8	2.8
Industrial	421	11.4	-49.5	122.2	3.2	85.5
Commercial	6,070	6.5	-16.7	25.2	65.6	0.9
Total new work	**14,752**	**-7.6**	**-5.2**	**22.9**	**10.2**	**9.0**

Source: ONS.
Ref: CSN Explained.

CONSTRUCTION OUTPUT – SHORT-TERM FORECASTS (2017–2018)

Regional Office for National Statistics (ONS) output statistics are published in current prices and are thus inclusive of any inflationary effect. At the time of writing, regional ONS construction output statistics were only available for the first three quarters of 2016.

In the nine months to September last year total construction output grew by 8% to £25.03bn (current prices) on an annualised basis. All new work sectors posted expansion bar the public housing one where a marginal fall of 1% to £1.15bn was recorded. Output in the public non-housing sector registered the biggest increase of 35% to £1.64bn whilst strong growth of 18% to £2.12bn was seen in the infrastructure one. Double digit rises were also experienced in the commercial (16%) and industrial markets (15%) whilst the private housing one recorded the smallest rise of 4% to £5bn. Overall, in 2016 total construction output in the capital is estimated to have increased by 3% in real terms to £29.75bn in 2013 prices.

Output is expected to rise by an annual average of 2.9% over the next two years. Growth is forecast to be stronger in the new work sector compared with the R&M one (3.5% vs 1.4%).

Over the next two years, with an annual average expansion of 16%, Greater London's infrastructure sector is projected to be the best performing one. Double digit growth is estimated for 2016 as work starts on the £1bn Northern Line Extension scheme with further similar expansion for this year mainly due to work on the Thames Tideway Tunnel project. Growth is likely to get even stronger in 2018 as work on the HS2 scheme starts on site. On this prognosis, infrastructure output will rise by over 50% in the three years to 2018, although it will remain below its 2011 peak.

The public non-housing sector is projected to see average yearly expansion of 6% over the short term. Good growth is predicted mainly due to work getting underway on UCL's new campus. Planning applications for UCL sites should have been submitted in late 2016 and given that they want to open the first site in 2019, the assumption is that construction will begin in 2017. Another university development in the pipeline involves London Southbank University, which has started searching for a partner to help with the £1.5bn revamp of its Elephant and Castle campus. The ten-year project will involve new teaching and conference facilities, offices, a reception area for the university and new student accommodation. It is thought the winning developer will be awarded the contract in September 2017.

Given the low level of orders and the difficult operating environment that housing associations and local authorities find themselves in, modest growth has been forecast for the public housing sector over the next two years. By 2018, output is forecast to be around 61% of its 2014 peak. Camden Council had planned to deliver 3,050 new homes in the borough between 2010 and 2025 under its Community Investment Programme. This is equivalent to around 204 homes per year however, to date just 277 have been completed. The council has stated that the cuts to local authority budgets and the Housing and Planning Act has hindered its progress.

The two sectors expected to perform poorly in the short term are the industrial and commercial ones with small annual average output declines in both (0.2% and 0.5% respectively). The industrial construction sector is now so small in the capital, accounting for only 1% of output in 2015, that it has little impact on the overall figures. Commercial construction, however, is the largest sector in London, driven primarily by office work. In the light of recent events there are concerns that some occupiers, particularly within the financial services industry, are unsure of maintaining their headcount in London. Many occupiers will wait to see what will become of 'financial passporting' before they can make decisions. The uncertainty surrounding Brexit is likely to lead to an increase in short-term lettings where mutually beneficial.

In terms of projects in the pipeline British Land have committed to the redevelopment of 100 Liverpool Street, 520,000 square feet of mixed office and retail space, upon which construction should start shortly to meet scheduled completion in 2019. It also has in the pipeline the refurbishment of 1 Finsbury Avenue, 281,000 square feet, which should be followed by the redevelopment of 2/3 Finsbury Avenue, a further 110,000 square feet. Also in the pipeline is a major refurbishment of 135 Bishopsgate, which consists of 340,000 square feet of office and retail space.

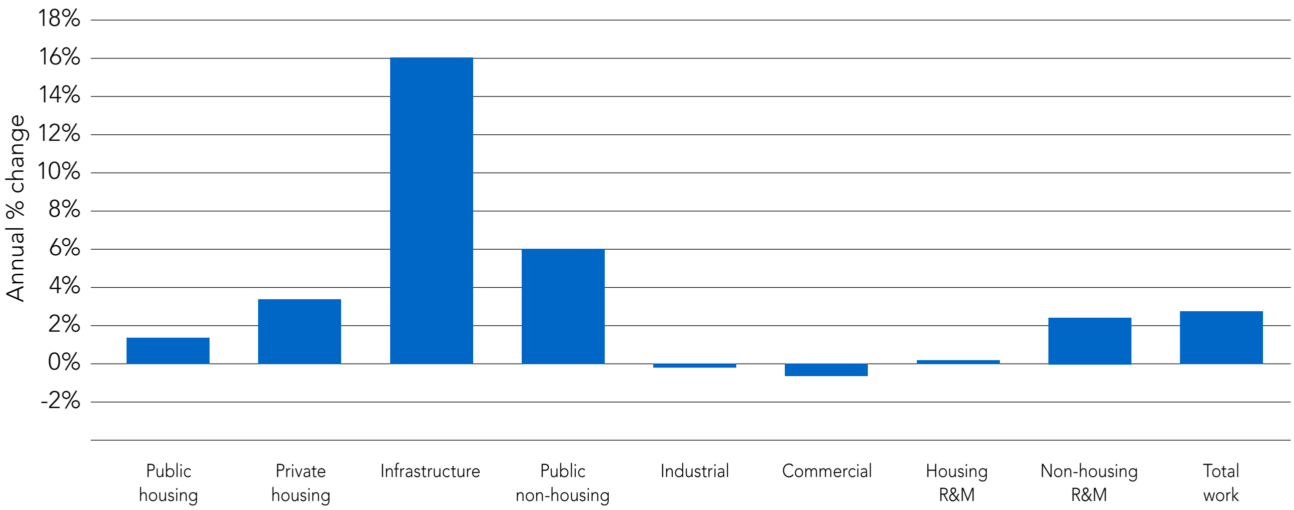
Outside of the offices sub-sector one of the biggest commercial projects in the pipeline in London is the redevelopment of Tottenham Hotspur's White Hart Lane stadium. Preparatory works have started, with main works expected to start in 2017 to have the stadium ready for the 2018/19 football season.

CONSTRUCTION OUTPUT – GREATER LONDON (£ MILLION, 2013 PRICES)

	Actual	Forecast annual % change			Annual average
	2015	2016	2017	2018	2017-2018
Public housing	1,381	-2%	2%	0%	1.3%
Private housing	5,927	-3%	2%	5%	3.3%
Infrastructure	2,424	13%	13%	19%	16.0%
Public non-housing	1,526	17%	7%	5%	6.0%
Industrial	287	34%	-3%	2%	-0.2%
Commercial	8,327	8%	-2%	1%	-0.5%
New work	**19,874**	**6%**	**2%**	**5%**	**3.5%**
Housing R&M	4,652	-3%	-1%	1%	0.2%
Non-housing R&M	4,334	-3%	2%	3%	2.5%
Total R&M	**8,986**	**-3%**	**1%**	**2%**	**1.4%**
Total work	**28,860**	**3%**	**2%**	**4%**	**2.9%**

Source: Experian.
Ref: CSN Explained.

ANNUAL AVERAGE CONSTRUCTION OUTPUT GROWTH 2017-2018 – GREATER LONDON



Source: Experian.
Ref: CSN Explained.

> Construction in the capital will grow on average of 2.4% per year.

CONSTRUCTION OUTPUT – LONG-TERM FORECASTS (2017–2021)

In the five years to 2021 Greater London's construction output is expected to rise by an annual average of 2.4%.

The infrastructure sector is anticipated to experience the highest annual average growth rate of 8%. The HS2 project is estimated to cost 2.1bn in 2018 and 3.5bn in 2019 in 2013/14 prices. Falls in output are predicted for the final two years of the forecast period as the bulk of work on HS2 moves into other regions and away from London.

London is likely to see annual average growth of 5.1% in its private housing market, above the UK rate of 2.1%. Demographic pressures in the city mean that there will always be demand for housing. There are many housing projects that are currently underway or planned over the next five years. Detailed works of the first phase of the regeneration of 101 hectares of Brent Cross and Cricklewood have been approved by Barnet Council. Preparation, design and eventual construction planned for this part of London can now go ahead, with the first works expected to start in early 2018. The project will include 7,500 homes. Plans have also been released for new homes on the former Carlsberg Tetley and Thames Wharf sites in Newham. The £100m project is likely to see the construction of around 3,000 new homes with work starting in the second half of 2017.

Output in the public non-housing sector is expected to stagnate in the second half of the forecast period after good growth in the first part, as work on the main university development projects continues but no longer increases. Growth is projected to average close to 2.5% a year over the whole of the forecast period.

Output in the capital's commercial sector is predicted to stagnate over the five years to 2021. This sector is believed to be the most vulnerable to the impact of the referendum vote due to its heavy reliance on overseas investors in the London market and it is likely that the biggest impact will be on the offices sub-sector. The British Bankers' Association has already stated that leading banks are planning to relocate some functions from the UK in early 2017, which could impact demand for new space. As has already been mentioned, the professional and other public services sector is by far the largest in the capital's economy and thus will be a major driver for demand for office space in London. While growth in the five years to 2015 averaged not far off 7% a year, the prognosis for the five years to 2021 is much weaker, at 2.4%.

It may well be that the focus of growth in the commercial construction sector will shift away from offices and towards retail, with a number of sizeable projects in the pipeline, including the redevelopment of Croydon town centre, which will consist of around 200,000 square metres of retail, leisure and residential facilities, valued at between £650m and £700m, the Goodsyard in Shoreditch, another mixed-use development which is scheduled to start this year with an estimated value of between £140m and £160m, as is the £475m to £550m Brent Cross extension.

BEYOND 2021

The Joint Committee of the Palace of Westminster has suggested that repairs to Parliament should start in 2023 and take around six years to complete. It is hoped that a detailed preparatory stage will take place to ensure that plans are cost effective. However, the Royal Institute of British Architects, which is behind the plans, has warned that a shortage of specialist skills could act as an obstacle for the refurbishment project.

According to the latest National Infrastructure Pipeline, work on the replacement of London's ageing underground cable infrastructure will continue outside the forecast period, estimated to be worth around £390m.

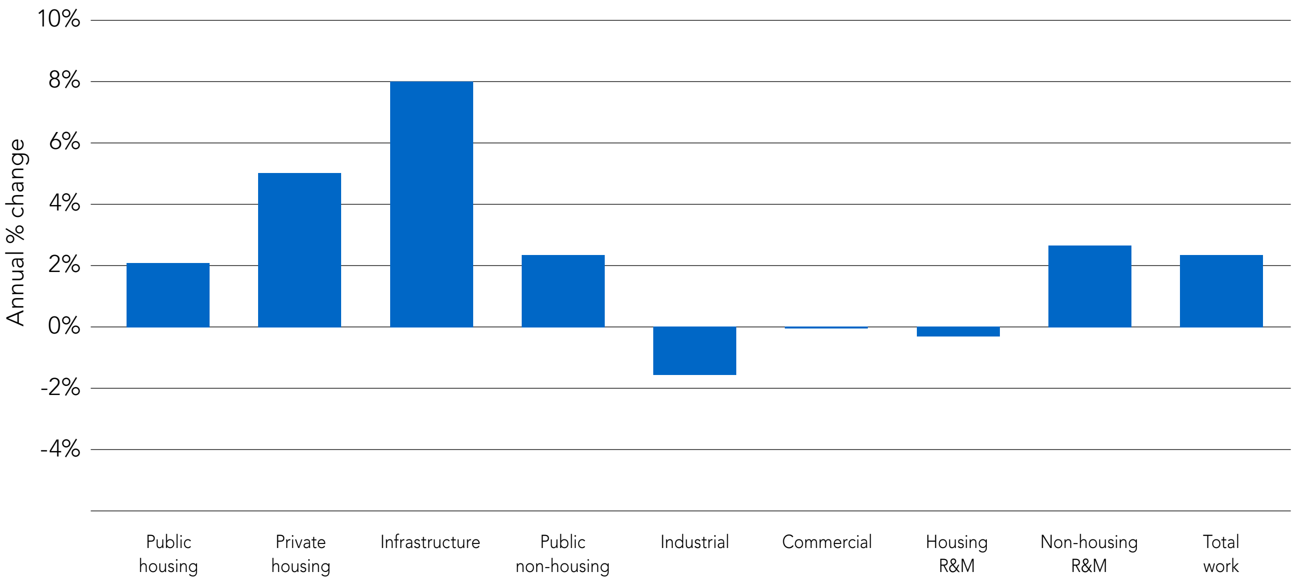
The biggest project in the pipeline post the current forecast period is undoubtedly Crossrail 2, which if commissioned will run south west to north east across the city, linking up with the already completed Crossrail 1 and the ongoing HS2. The scheme has been undergoing a series of public consultations and over the next couple of years the preferred option will be finalised. If all goes to plan then work should start on the project in the early 2020s to become operational in the early 2030s.

CONSTRUCTION OUTPUT – GREATER LONDON (£ MILLION, 2013 PRICES)

	Estimate	Forecast annual % change					Annual average
	2016	2017	2018	2019	2020	2021	2017-2021
Public housing	1,353	2%	0%	2%	5%	1%	2.1%
Private housing	5,769	2%	5%	9%	4%	6%	5.1%
Infrastructure	2,732	13%	19%	22%	-2%	-9%	8.0%
Public non-housing	1,793	7%	5%	-1%	0%	1%	2.4%
Industrial	384	-3%	2%	-2%	-2%	-2%	-1.4%
Commercial	8,990	-2%	1%	-1%	-2%	3%	-0.1%
New work	**21,021**	**2%**	**5%**	**6%**	**0%**	**1%**	**2.9%**
Housing R&M	4,526	-1%	1%	0%	0%	-2%	-0.3%
Non-housing R&M	4,203	2%	3%	3%	3%	2%	2.6%
R&M	**8,728**	**1%**	**2%**	**1%**	**1%**	**0%**	**1.2%**
Total work	**29,750**	**2%**	**4%**	**5%**	**1%**	**1%**	**2.4%**

Source: CSN, Experian.
Ref: CSN Explained.

ANNUAL AVERAGE CONSTRUCTION OUTPUT GROWTH 2017-2021 – GREATER LONDON



Source: CSN, Experian.
Ref: CSN Explained.

CONSTRUCTION EMPLOYMENT FORECASTS FOR GREATER LONDON

TOTAL CONSTRUCTION EMPLOYMENT FORECASTS BY OCCUPATION

The table presents actual construction employment (SICs 41-43, 71.1 and 74.9) in Greater London for 2015, the estimated total employment across 28 occupational categories in 2016 and forecasts for the industry for 2017 to 2021. A full breakdown of occupational groups is provided in Section 5 of CSN Explained.

Greater London accounted for 15.6% of construction employment in 2015 and this is projected to rise to 16.3% in 2021 by which point employment levels should be just short of their 2008 peak. Over the next five years the capital's construction employment is likely to rise by 1.3% per year on average, above the UK rate of 0.6%. Expansion is predicted for 21 of the 28 occupational categories, with construction project managers projected to see the strongest annual average growth of 3.6%. By the end of the forecast period, employment in this occupation is likely to have reached a new high of 14,650.

In 2021, the largest construction trade occupation in the region is anticipated to be wood trades and interior fit out, accounting for around 10% of the total workforce. Building envelope specialists are expected to be the second biggest construction trade occupation accounting for approximately 6% of the total workforce. At the UK level, whilst the wood trades and interior fit out category is also projected to be the largest trade occupation by 2021, the second biggest one is predicted to be the electrical trades and installation category.

TOTAL EMPLOYMENT BY OCCUPATION – GREATER LONDON

	Actual	Estimate	Forecast	
	2015	2016	2017	2021
Senior, executive, and business process managers	26,110	27,050	27,310	30,490
Construction project managers	12,190	12,280	12,930	14,650
Other construction process managers	35,000	36,060	35,670	37,910
Non-construction professional, technical, IT, and other office-based staff	58,190	60,160	59,920	65,670
Construction trades supervisors	7,370	7,950	7,870	8,580
Wood trades and interior fit-out	41,400	41,280	43,470	43,240
Bricklayers	6,350	6,430	6,850	7,100
Building envelope specialists	23,410	23,400	24,480	24,280
Painters and decorators	18,750	19,080	19,670	19,000
Plasterers	3,940	3,930	4,010	3,670
Roofers	2,890	2,950	3,110	3,180
Floorers	2,900	2,890	3,020	2,960
Glaziers	4,720	4,960	5,140	5,110
Specialist building operatives nec*	9,180	9,000	9,700	9,640
Scaffolders	1,380	1,520	1,430	1,580
Plant operatives	4,930	4,860	5,020	5,720
Plant mechanics/fitters	3,350	3,340	3,320	2,980
Steel erectors/structural fabrication	2,690	2,720	2,820	2,710
Labourers nec*	15,170	15,690	15,390	15,710
Electrical trades and installation	21,180	20,770	21,550	20,400
Plumbing and HVAC Trades	20,700	20,600	20,940	19,210
Logistics	2,820	2,900	2,950	3,400
Civil engineering operatives nec*	2,030	2,080	2,040	2,310
Non–construction operatives	6,070	6,550	6,620	7,780
Civil engineers	9,380	10,030	10,000	11,100
Other construction professionals and technical staff	28,380	30,450	30,870	35,340
Architects	14,760	16,250	16,120	18,010
Surveyors	15,800	16,480	16,090	17,050
Total (SIC 41-43)	**332,720**	**338,450**	**345,230**	**357,280**
Total (SIC 41-43, 71.1, 74.9)	**401,040**	**411,660**	**418,310**	**438,780**

Source: ONS, CSN, Experian.
*Ref: CSN Explained. *Not elsewhere classified.*

ANNUAL RECRUITMENT REQUIREMENT (ARR) BY OCCUPATION

The ARR is a gross requirement that takes into account workforce flows into and out of construction, due to factors such as movements between industries, migration, sickness and retirement. However, these flows do not include movements into the industry from training, due to the inconsistency and coverage of supply data. Thus, the annual recruitment requirement provides an indication of the number of new employees that would need to be recruited into construction each year in order to realise forecast output.

The total ARR for Greater London has a green light indicating that there is a low requirement for extra recruits during the forecast period. Greater London's annual average recruitment requirement, at 3,870, represents 0.9% of base 2017 employment. The corresponding ARR rate for the UK is higher at 1.4%. London traditionally has a very low ARR as it naturally acts as a magnet for the construction workforce from other areas of the country and overseas.

The traffic lights suggest that the occupations under some pressure are likely to be construction trade supervisors, plant operatives, logistics personnel and civil engineers, all with ARR ratios in excess of 2.6% but less than 5%. However, we can only say that this might be an indication of future skills shortages as inflows from training in the model are set to zero. There is on-going research trying to scope out the number of new entrants to the industry from training and it is hoped in the future to be able to turn this 'switch' on.

Please note that all of the ARRs presented in this section are employment requirements and not necessarily training requirements. This is because some new entrants to the construction industry, such as skilled migrants or those from other industries where similar skills are already used, will be able to work in the industry without the need for significant retraining.

Non-construction operatives is a diverse occupational group including all of the activities under the SICs 41-43, 71.1 and 74.9 umbrella that cannot be classified elsewhere, such as cleaners, elementary security occupations nec. and routine inspectors and testers. The skills required in these occupations are highly transferable to other industries and forecasting such movement is hazardous given the lack of robust supportive data. Therefore, the ARR for non-construction operatives is not published.

ANNUAL RECRUITMENT REQUIREMENT BY OCCUPATION – GREATER LONDON

	2017-2021
Senior, executive, and business process managers	350
Construction project managers	220
Other construction process managers	280
Non-construction professional, technical, IT, and other office-based staff	1,530
Construction trades supervisors	280
Wood trades and interior fit-out	–
Bricklayers	–
Building envelope specialists	170
Painters and decorators	–
Plasterers	–
Roofers	–
Floorers	–
Glaziers	–
Specialist building operatives nec*	–
Scaffolders	<50
Plant operatives	190
Plant mechanics/fitters	–
Steel erectors/structural fabrication	–
Labourers nec*	–
Electrical trades and installation	110
Plumbing and HVAC Trades	–
Logistics	110
Civil engineering operatives nec*	–
Civil engineers	430
Other construction professionals and technical staff	170
Architects	–
Surveyors	–
Total (SIC 41-43)	**3,270**
Total (SIC 41-43, 71.1, 74.9)	**3,870**

Source: CSN, Experian.
*Ref: CSN Explained. *Not elsewhere classified.*

COMPARISONS ACROSS THE UK

As is usually the case, the 1.7% annual average output growth rate for the UK as a whole masks considerable differences in the projected rates for individual English regions and the devolved nations, from expansion of over 6% a year on average in Wales to a decline of 0.4% in Scotland on the same measure.

Wales and the South West remain on top of the growth rankings due to the prospective start of new nuclear build at Wylfa Newydd and Hinkley Point respectively in their areas. However, Wales in particular is not necessarily a 'one-hit wonder' with other sizeable projects such as the M4 upgrade around Newport due to start in the forecast period.

The Greater London construction market is more vulnerable than most to a fall in business investment because of the large size of its commercial sector. However, a weak performance here is expected to be more than compensated for by strong growth in infrastructure, driven in part by the start of work on HS2, and private housing, fuelled by strong increases in the capital's population.

The other two regions expected to see annual average output growth in excess of 2% are the North West (2.5%) and the South East (2.2%). Growth in the former will be driven by energy and transport projects, the largest of which is the prospective new nuclear build facility at Moorside. In the latter, new renewable energy facilities should drive growth in the infrastructure sector and the commercial construction sector will benefit from the theme park in north Kent.

For the remainder of the English regions growth is predicted to range between an annual average rate of 1.3% in the West Midlands, which should see some HS2-related work by the end of the forecast period, to a marginal decline of 0.1% in the North East, which will suffer from a dearth of major projects and weak housing demand.

Scotland is projected to be the worst performing of all the regions and devolved nations, with an annual average decline of 0.4%. The primary reason for this is a sharp fall in infrastructure output from its current very high level as a number of large projects, such as the Queensferry Crossing, the M8/M73/M74 motorway upgrade, and the Aberdeen Western Peripheral Route, are completed over the next two years.

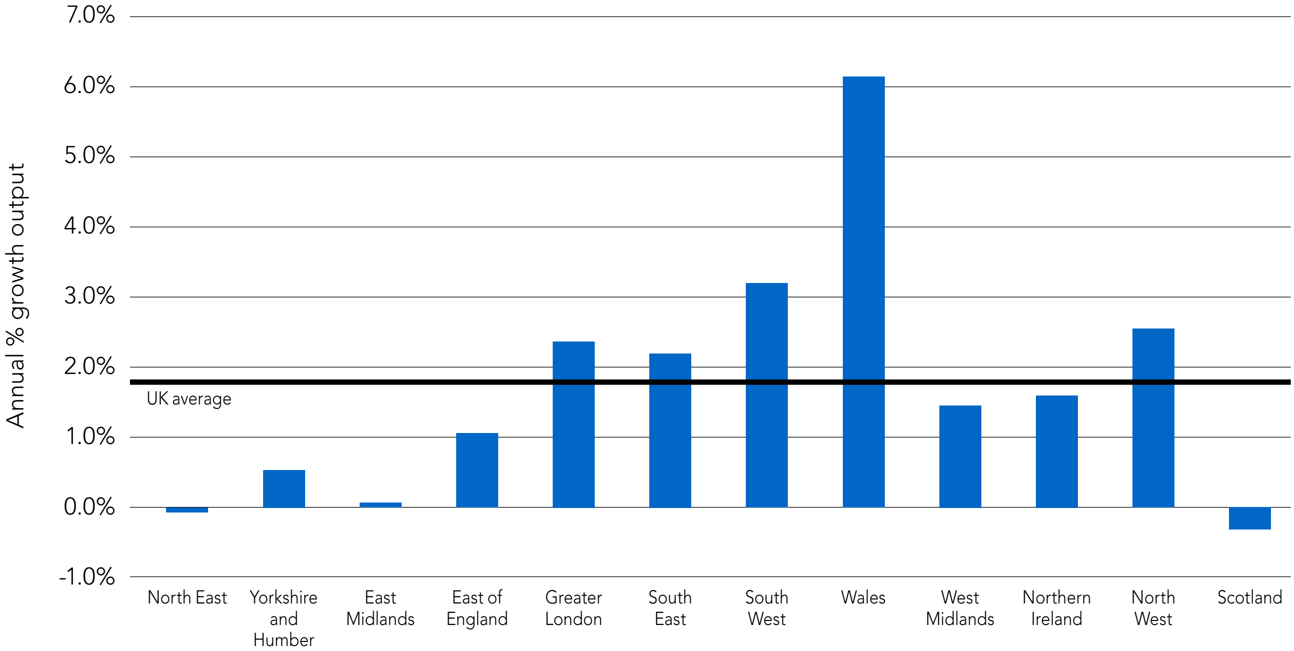
Employment growth across the regions and devolved nations tends to mirror that of output, but at a lower level to take account of expected productivity gains and with some minor adjustments depending on whether output growth is in high or low labour-intensive sectors. Annual average employment growth is projected to range from a high of 2.7% in Wales to a low of -0.8% in Scotland, against a UK rate of 0.6%.

The impact of new nuclear build on employment in the regions and devolved nations that will host such projects is much less than on output due to its capital rather than labour-intensive nature. However, it still boosts employment growth in Wales quite considerably as it is a very big project in a small market. The impact is smaller in the South West, which has a bigger construction market, and thus contributes less to overall employment growth, which is expected to be around 0.7% a year on average over the five years to 2021.

Output growth in Scotland, the North East, East Midlands, and Yorkshire and Humber will not be strong enough to drive growth in employment; thus, these are all expected to experience some fall in construction employment between 2017 and 2021.

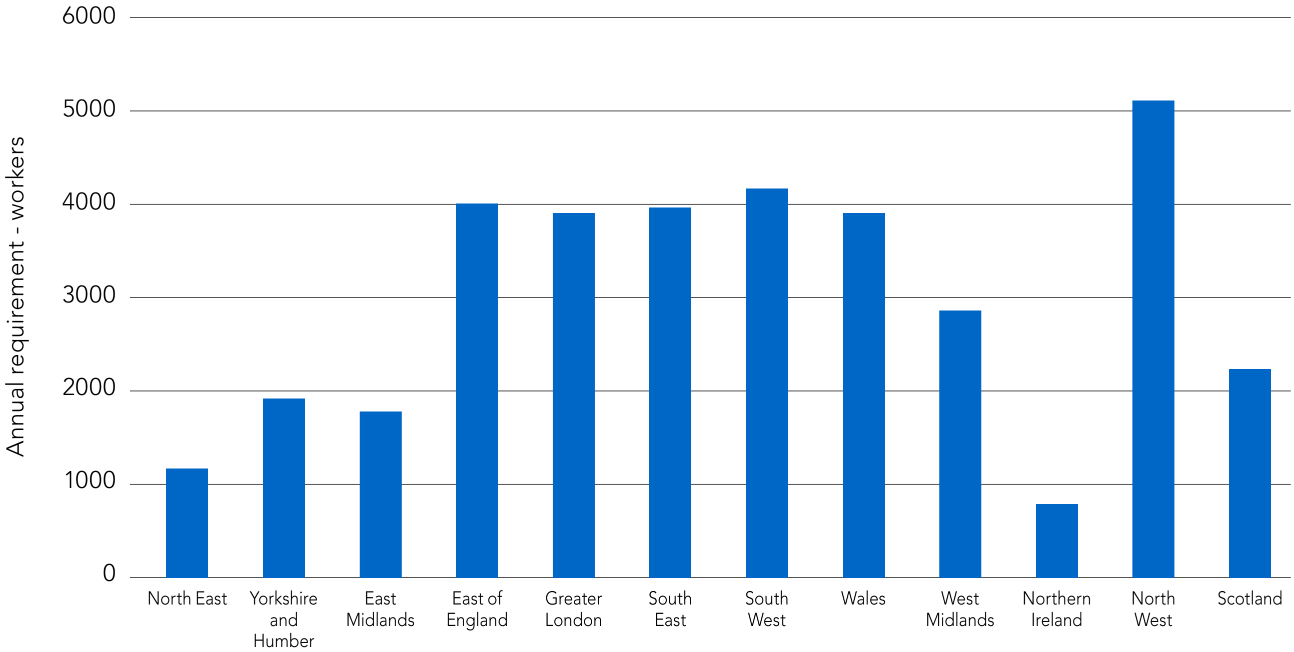
The pattern of annual recruitment requirements can look significantly different to the profile of output and employment, as some regions and devolved nations have historically strong net inflows and some suffer from large net outflows. Thus, Greater London's ARR represents just 0.9% of base 2017 employment, the lowest ratio along with Yorkshire and Humber, despite being high up the rankings in terms of output and employment growth. This is because the capital naturally acts as a magnet for the construction workforce from other parts of the country and from abroad; thus, its additional requirement is relatively small. At the other end of the scale Wales traditionally suffers strong net outflows, in particular to the North West and South West of England and often has the highest ARR ratio as a result of this. The 2017 to 2021 period is no exception, with buoyant output and employment growth and the strong net outflows leading to an ARR ratio of 3.4% of base 2017 employment. The remaining regions and devolved nations have an ARR ratio of between 1% and 1.9% of base 2017 employment.

ANNUAL AVERAGE OUTPUT GROWTH BY REGION 2017-2021



Source: CSN, Experian.
Ref: CSN Explained.

ANNUAL RECRUITMENT REQUIREMENT (ARR) BY REGION 2017-2021



Source: CSN, Experian.

> Employment in Greater London will grow on average by 1.3% per year, higher than the UK average of 0.6%.

CSN EXPLAINED

This appendix provides further details and clarification of some of the points covered in the report.

CSN METHODOLOGY gives an overview of the underpinning methods that are used by the CSN, working in partnership with Experian, to produce the suite of reports at a UK, national and regional level.

GLOSSARY provides clarification on some of the terms that are used in the reports.

NOTES has some further information relating to the data sources used for the various charts and tables. This section also outlines what is meant by the term 'footprint', when talking about the areas of responsibility.

DEFINITIONS explains the sector definitions used within the report and provides examples of what is covered in each.

OCCUPATIONAL GROUPS gives a detailed breakdown of the 28 occupational groups into the individual standard occupational classification (SOC) codes that are aggregated to provide the employment and recruitment requirement.

CSN METHODOLOGY

BACKGROUND

The Construction Skills Network has been evolving since its conception in 2005, acting as a vehicle for CITB and CITB Northern Ireland to collect and produce information on the future employment and training needs of the industry.

The CSN functions at both a national and regional level. It comprises a National Group, 12 Observatory groups, a forecasting model for each of the regions and countries, and a Technical Reference Group. An Observatory group currently operates in each of the nine English regions and also in Wales, Scotland and Northern Ireland.

Observatory groups currently meet twice a year and consist of key regional stakeholders invited from industry, Government, education and sector bodies, all of whom contribute their local industry knowledge and views on training, skills, recruitment, qualifications and policy. The National Group also includes the same range of representatives and meets twice per year to set the national scheme, forming a backdrop for the Observatories.

At the heart of the CSN are several models that generate forecasts of employment requirements within the industry for a range of occupational groups. The models are designed and managed by Experian under the independent guidance and validation of the Technical Reference Group, which is comprised of statisticians and modelling experts.

The models have evolved over time and will continue to do so, to ensure that they account for new research as it is published, as well as new and improved modelling techniques.

Future changes to the model will only be made after consultation with the Technical Reference Group.

THE MODEL APPROACH

The model approach relies on a combination of primary research and views from the CSN to facilitate it. National data is used as the basis for the assumptions that augment the models, which are then adjusted with the assistance of the Observatories and National Group. Each English region, Wales, Scotland and Northern Ireland has a separate model (although all models are interrelated due to labour movements) and, in addition, there is one national model that acts as a constraint to the individual models and enables best use to be made of the most robust data (which is available at the national level).

The models work by forecasting demand and supply of skilled workers separately. The difference between demand and supply forms the employment requirement. The forecast total employment levels are derived from expectations about construction output and productivity. Essentially, this is based upon the question 'How many people will be needed to produce forecast output, given the assumptions made about productivity?'.

The annual recruitment requirement (ARR) is a gross requirement that takes into account workforce flows into and out of construction, due to such factors as movements between industries, migration, sickness and retirement. However, these flows do not include movements into the industry from training, although robust data on training provision is being developed by CITB in partnership with public funding agencies, further education, higher education and employer representatives. The ARR provides an indication of the number of new employees that would need to be recruited into construction each year in order to realise forecast output.

Estimates of demand are based on the results of discussion groups comprising industry experts, a view of construction output and integrated models relating to wider national and regional economic performance. The models are dynamic and reflect the general UK economic climate at any point in time. To generate the labour demand, the models use a set of specific statistics for each major type of work to determine the employment, by trade, needed to produce the predicted levels of construction output. The labour supply for each type of trade or profession is based upon the previous year's supply (the total stock of employment) combined with flows into and out of the labour market.

The key leakages (outflows) that need to be considered are:

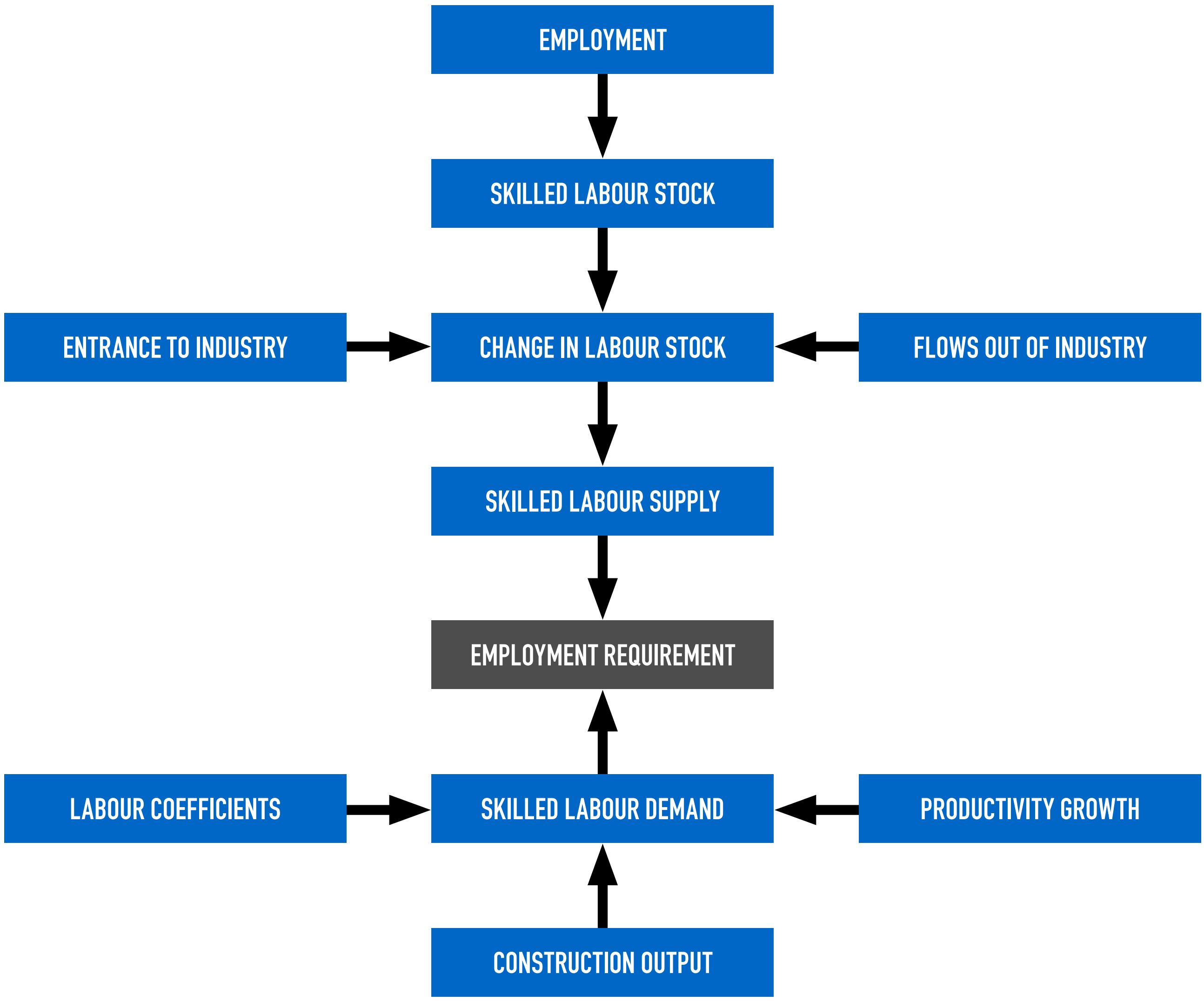
- Transfers to other industries
- International/domestic out migration
- Permanent retirements
  (including permanent sickness)
- Outflow to temporary sickness and home duties.

The main reason for outflow is likely to be transfer to other industries.

Flows into the labour market include:

- Transfers from other industries
- International/domestic immigration
- Inflow from temporary sickness and home duties.

The most significant inflow is likely to be from other industries. A summary of the model is shown in the flow chart.



GLOSSARY OF TERMS

Building envelope specialists – any trade involved with the external cladding of a building other than bricklaying, e.g. curtain walling.

Demand – this is calculated using construction output data from the Office for National Statistics (ONS) and the Department of Finance and Personnel Northern Ireland (DFP), along with vacancy data from the National Employer Skills Survey, produced by the Department for Education and Skills. These data sets are translated into labour requirements by trade using a series of coefficients to produce figures for labour demand that relate to forecast output levels.

GDP (gross domestic product) – total market value of all final goods and services produced. A measure of national income. GDP = GVA plus taxes on products minus subsidies on products.

GVA (gross value added) – total output minus the value of inputs used in the production process. GVA measures the contribution of the economy as a difference between gross output and intermediate outputs.

Coefficients – to generate the labour demand, the model makes use of a set of specific statistics for each major type of work, to determine employment by trade or profession, based upon the previous year's supply. In essence, this is the number of workers of each occupation or trade needed to produce £1m of output across each sub-sector.

LFS (Labour Force Survey) – a UK household sample survey that collects information on employment, unemployment, flows between sectors and training. Information is collected from around 53,000 households each quarter (the sample totals more than 100,000 people).

LMI (labour market intelligence) – data that is quantitative (numerical) or qualitative (insights and perceptions) on workers, employers, wages, conditions of work, etc.

Macroeconomics – the study of an economy at a national level, including total employment, investment, imports, exports, production and consumption.

Nec – not elsewhere classified, used as a reference in LFS data.

ONS (Office for National Statistics) – organisation producing official statistics on the economy, population and society at both a national and local level.

Output – total value of all goods and services produced in an economy.

Productivity – output per employee. SIC codes (Standard Industrial Classification codes) – from the United Kingdom Standard Industrial Classification of Economic Activities produced by the ONS.

SOC codes (Standard Occupational Classification codes) – from the United Kingdom Standard Occupational Classification produced by the ONS.

Supply – the total stock of employment in a period of time, plus the flows into and out of the labour market. Supply is usually calculated from LFS data.

NOTES

NOTES

1 Except for Northern Ireland, output data for the English regions, Scotland and Wales is supplied by the Office for National Statistics (ONS) on a current price basis. Thus, national deflators produced by the ONS have been used to deflate prices to a 2005 constant price basis, so that the effects of inflation have been stripped out.

2 The annual average growth rate of output is a compound average growth rate, i.e. the rate at which output would grow each year if it increased steadily over the forecast period.

3 Only selected components of gross value added (GVA) are shown in this table and so do not sum to the total.

4 For new construction orders, comparison is made with Great Britain rather than the UK, owing to the fact that there are no orders data series for Northern Ireland.

5 Employment numbers are rounded to the nearest 10.

6 The tables include data relating to plumbers and electricians. As part of SIC 43, plumbers and electricians working in contracting are an integral part of the construction process.

7 A reporting minimum of 50 is used for the annual recruitment requirement (ARR). As a result, some region and devolved nation ARR forecasts do not sum to the total UK requirement.

8 The Employment and ARR tables show separate totals for SIC 41–43 and SIC 41–43, 71.1 and 74.9. The total for SIC 41–43 covers the first 24 occupational groups on the relevant tables and excludes civil engineers, other construction professionals and technical staff, architects and surveyors. The total for SIC 41–43, 71.1 and 74.9 includes all occupations.

FOOTPRINTS FOR BUILT ENVIRONMENT SECTOR

CITB and CITB Northern Ireland are responsible for SIC 41 Construction of buildings, SIC 42 Civil engineering, SIC 43 Specialised construction activities and SIC 71.1 Architectural and engineering activities and related technical consultancy.

The table summarises the SIC codes (2007) covered by CITB and CITB Northern Ireland:

CITB and CITB Northern Ireland	
SIC Code	Description
41.1	Development of building projects
41.2	Construction of residential and non-residential buildings
42.1	Construction of roads and railways
42.2	Construction of utility projects
42.9	Construction of other civil engineering projects
43.1	Demolition and site preparation
43.3	Building completion and finishing
43.9	Other specialised construction activities nec
71.1	Architectural and engineering activities and related technical consultancy

The CSN's current baseline forecast assumes that a deal between the UK and EU will be agreed within a 4 year time horizon, with some form of trade access to the single market. As it is unlikely that the trade terms will be as favourable as the current situation, the forecast includes a small downgrade to the UK's long term export and investment projections, compared to the pre-Brexit vote baseline. No adjustments have been made to underlying population projections in the base case as it is too early to assess any potential slowdown in EU migration.

DEFINITIONS: TYPES AND EXAMPLES OF CONSTRUCTION WORK

Public sector housing – local authorities and housing associations, new towns and government departments

Housing schemes, care homes for the elderly and the provision within housing sites of roads and services for gas, water, electricity, sewage and drainage.

Private sector housing

All privately owned buildings for residential use, such as houses, flats and maisonettes, bungalows, cottages and the provision of services to new developments.

Infrastructure – public and private

Water
Reservoirs, purification plants, dams, water works, pumping stations, water mains, hydraulic works etc.

Sewerage
Sewage disposal works, laying of sewers and surface drains.

Electricity
Building and civil engineering work for electrical undertakings, such as power stations, dams and other works on hydroelectric schemes, onshore wind farms and decommissioning of nuclear power stations.

Gas, communications, air transport
Gas works, gas mains and gas storage; post offices, sorting offices, telephone exchanges, switching centres etc.; air terminals, runways, hangars, reception halls, radar installations.

Railways
Permanent way, tunnels, bridges, cuttings, stations, engine sheds etc., signalling and other control systems and electrification of both surface and underground railways.

Harbours
All works and buildings directly connected with harbours, wharves, docks, piers, jetties, canals and waterways, sea walls, embankments and water defences.

Roads
Roads, pavements, bridges, footpaths, lighting, tunnels, flyovers, fencing etc.

Public non-residential construction[1]

Factories and warehouses
Publicly owned factories, warehouses, skill centres.

Oil, steel, coal
Now restricted to remedial works for public sector residual bodies.

Schools, colleges, universities
State schools and colleges (including technical colleges and institutes of agriculture); universities, including halls of residence, research establishments etc.

Health
Hospitals including medical schools, clinics, welfare centres, adult training centres.

Offices
Local and central Government offices, including town halls, offices for all public bodies except the armed services, police headquarters.

Entertainment
Theatres, restaurants, public swimming baths, caravan sites at holiday resorts, works and buildings at sports grounds, stadiums, racecourses etc. owned by local authorities or other public bodies.

Garages
Buildings for storage, repair and maintenance of road vehicles, transport workshops, bus depots, road goods transport depots and car parks.

Shops
Municipal shopping developments for which the contract has been let by a Local Authority.

Agriculture
Buildings and work on publicly financed horticultural establishments; fen drainage and agricultural drainage, veterinary clinics.

Miscellaneous
All work not clearly covered by any other headings, such as fire stations, police stations, prisons, reformatories, remand homes, civil defence work, UK Atomic Energy Authority work, council depots, museums, libraries.

Private industrial work

Factories, warehouses, wholesale depots, all other works and buildings for the purpose of industrial production or processing, oil refineries, pipelines and terminals, concrete fixed leg oil production platforms (not rigs); private steel work; all new coal mine construction such as sinking shafts, tunnelling etc.

Private commercial work[1]

Schools and universities
Schools and colleges in the private sector, financed wholly from private funds.

Health
Private hospitals, nursing homes, clinics.

Offices
Office buildings, banks.

Entertainment
Privately owned theatres, concert halls, cinemas, hotels, public houses, restaurants, cafés, holiday camps, swimming pools, works and buildings at sports grounds, stadiums and other places of sport or recreation, youth hostels.

Garages
Repair garages, petrol filling stations, bus depots, goods transport depots and any other works or buildings for the storage, repair or maintenance of road vehicles, car parks.

Shops
All buildings for retail distribution such as shops, department stores, retail markets, showrooms etc.

Agriculture
All buildings and work on farms, horticultural establishments.

Miscellaneous
All work not clearly covered by any other heading, e.g. exhibitions, caravan sites, churches, church halls.

New work

New housing
Construction of new houses, flats, bungalows only.

All other types of work
All new construction work and all work that can be referred to as improvement, renovation or refurbishment and which adds to the value of the property.[2]

Repair and maintenance

Housing
Any conversion of, or extension to, any existing dwelling and all other work such as improvement, renovation, refurbishment, planned maintenance and any other type of expenditure on repairs or maintenance.

All other sectors:
Repair and maintenance work of all types, including planned and contractual maintenance.[3]

[1] Where contracts for the construction or improvement of non-residential buildings used for public service provision, such as hospitals, are awarded by private sector holders of contracts awarded under the Private Finance Initiative, the work is classified as 'private commercial'.

[2] Contractors reporting work may not always be aware of the distinction between improvement or renovation work and repair and maintenance work in the non-residential sectors.

[3] Except where stated, mixed development schemes are classified to whichever sector provides the largest share of finance.

OCCUPATIONAL GROUPS

Occupational group

Description, SOC (2010) reference.

Senior, executive, and business process managers

Chief executives and senior officials	1115
Financial managers and directors	1131
Marketing and sales directors	1132
Purchasing managers and directors	1133
Human resource managers and directors	1135
Property, housing and estate managers	1251
Information technology and telecommunications directors	1136
Research and development managers	2150
Managers and directors in storage and warehousing	1162
Managers and proprietors in other services nec*	1259
Functional managers and directors nec*	1139
IT specialist managers	2133
IT project and programme managers	2134
Financial accounts managers	3538
Sales accounts and business development managers	3545

Construction project managers

Construction project managers and related professionals	2436

Other construction process managers

Production managers and directors in manufacturing	1121
Production managers and directors in construction	1122
Managers and directors in transport and distribution	1161
Waste disposal and environmental services managers	1255
Health and safety officers	3567
Conservation and environmental associate professionals	3550

Non-construction professional, technical, IT, and other office-based staff (excl. managers)

IT operations technicians	3131
IT user support technicians	3132
Finance and investment analysts and advisers	3534
Taxation experts	3535
Financial and accounting technicians	3537
Vocational and industrial trainers and instructors	3563
Business and related associate professionals nec*	3539
Legal associate professionals	3520
Inspectors of standards and regulations	3565
Programmers and software development professionals	2136
Information technology and telecommunications professionals nec*	2139
Estate agents and auctioneers	3544
Solicitors	2413
Legal professionals nec*	2419
Chartered and certified accountants	2421
Business and financial project management professionals	2424
Management consultants and business analysts	2423
Receptionists	4216
Typists and related keyboard occupations	4217
Business sales executives	3542
Bookkeepers, payroll managers and wages clerks	4122
Records clerks and assistants	4131
Stock control clerks and assistants	4133
Telephonists	7213
Communication operators	7214
Personal assistants and other secretaries	4215
Sales and retail assistants	7111
Telephone salespersons	7113
Buyers and procurement officers	3541
Human resources and industrial relations officers	3562
Credit controllers	4121
Company secretaries	4214
Sales related occupations nec*	7129
Call and contact centre occupations	7211
Customer service occupations nec*	7219
Elementary administration occupations nec*	9219
Chemical scientists	2111
Biological scientists and biochemists	2112
Physical scientists	2113
Laboratory technicians	3111
Graphic designers	3421
Environmental health professionals	2463
IT business analysts, architects and systems designers	2135
Conservation professionals	2141
Environment professionals	2142
Actuaries, economists and statisticians	2425
Business and related research professionals	2426
Finance officers	4124
Financial administrative occupations nec*	4129
Human resources administrative occupations	4138
Sales administrators	4151
Other administrative occupations nec*	4159
Office supervisors	4162
Sales supervisors	7130
Customer service managers and supervisors	7220
Office managers	4161

Construction trades supervisors

Skilled metal, electrical and electronic trades supervisors	5250
Construction and building trades supervisors	5330

Wood trades and interior fit-out

Carpenters and joiners	5315
Paper and wood machine operatives	8121
Furniture makers and other craft woodworkers	5442
Construction and building trades nec* (25%)	5319

Bricklayers

Bricklayers and masons	5312

Building envelope specialists

Construction and building trades nec* (50%)	5319

Painters and decorators

Painters and decorators	5323
Construction and building trades nec* (5%)	5319

Plasterers

Plasterers	5321

Roofers

Roofers, roof tilers and slaters	5313

Floorers

Floorers and wall tilers	5322

Glaziers

Glaziers, window fabricators and fitters	5316
Construction and building trades nec* (5%)	5319

Specialist building operatives not elsewhere classified (nec*)

Construction operatives nec* (100%)	8149
Construction and building trades nec* (5%)	5319
Industrial cleaning process occupations	9132
Other skilled trades nec*	5449

Scaffolders

Scaffolders, stagers and riggers	8141

Plant operatives

Crane drivers	8221
Plant and machine operatives nec*	8129
Fork-lift truck drivers	8222
Mobile machine drivers and operatives nec*	8229

Plant mechanics/fitters

Metalworking production and maintenance fitters	5223
Precision instrument makers and repairers	5224
Vehicle technicians, mechanics and electricians	5231
Elementary process plant occupations nec*	9139
Tool makers, tool fitters and markers-out	5222
Vehicle body builders and repairers	5232

Steel erectors/structural fabrication

Steel erectors	5311
Welding trades	5215
Metal plate workers and riveters	5214
Construction and building trades nec* (5%)	5319
Smiths and forge workers	5211
Metal machining setters and setter-operators	5221

Labourers nec*

Elementary construction occupations (100%)	9120

Electrical trades and installation

Electricians and electrical fitters	5241
Electrical and electronic trades nec*	5249
Telecommunications engineers	5242

Plumbing and heating, ventilation, and air conditioning trades

Plumbers and heating and ventilating engineers	5314
Pipe fitters	5216
Construction and building trades nec* (5%)	5319
Air-conditioning and refrigeration engineers	5225

Logistics

Large goods vehicle drivers	8211
Van drivers	8212
Elementary storage occupations	9260
Buyers and purchasing officers (50%)	3541
Transport and distribution clerks and assistants	4134

Civil engineering operatives not elsewhere classified (nec*)

Road construction operatives	8142
Rail construction and maintenance operatives	8143
Quarry workers and related operatives	8123

Non-construction operatives

Metal making and treating process operatives	8117
Process operatives nec*	8119
Metalworking machine operatives	8125
Water and sewerage plant operatives	8126
Assemblers (vehicles and metal goods)	8132
Routine inspectors and testers	8133
Assemblers and routine operatives nec*	8139
Elementary security occupations nec*	9249
Cleaners and domestics*	9233
Street cleaners	9232
Gardeners and landscape gardeners	5113
Caretakers	6232
Security guards and related occupations	9241
Protective service associate professionals nec*	3319

Civil engineers

Civil engineers	2121

Other construction professionals and technical staff

Mechanical engineers	2122
Electrical engineers	2123
Design and development engineers	2126
Production and process engineers	2127
Quality control and planning engineers	2461
Engineering professionals nec*	2129
Electrical and electronics technicians	3112
Engineering technicians	3113
Building and civil engineering technicians	3114
Science, engineering and production technicians nec*	3119
Architectural and town planning technicians*	3121
Draughtspersons	3122
Quality assurance technicians	3115
Town planning officers	2432
Electronics engineers	2124
Chartered architectural technologists	2435
Estimators, valuers and assessors	3531
Planning, process and production technicians	3116

Architects

Architects	2431

Surveyors

Quantity surveyors	2433
Chartered surveyors	2434

**Not elsewhere classified*

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In association with