



WHOLE LIFE CONSULTANTS LTD

Forecasting Wales' Future Construction Skills

Final Report



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1. Introduction to the project

The construction industry both nationally and in Wales continues to face significant challenges in recruiting sufficient workers with the required skills to meet and deliver future workload expectations. One of the greatest constraints to predicting future skills requirements is the uncertainty surrounding future work – the content, the timing, the certainty of investment funding and the impact of changes on any projections are all variables which introduce uncertainty to any projections.

Understanding future pipelines or ‘demand’ is only part of the challenge. Having significant insight into current labour supply and who is entering the industry through training is imperative if skills gaps and shortages are to be identified and mitigated in the longer term.

This project is unique for in that it will, for the first time create an evidence base for Wales that will drill down to a granular sub-regional level for North Wales, South West and Mid Wales and South East Wales.

The project has been initiated and supported throughout by industry stakeholders and the teams that deliver the Learning and Regional Skills Planning in Wales. The analysis has involved both a ‘top-down’ and ‘bottom-up’ approach to sourcing data and information, ensuring it is as accurate as possible and as complete as possible, given the movement of investment planning.

The project covers a five year timeline and as well as exploring sub-regional forecasts it will produce evidence by type of work (housing, infrastructure, repair & maintenance, etc.) and highlight potential skills gaps and shortages at occupational level, emphasising where the risk is highest.

This report covers demand and the supply of labour in detail. It also provides a view of apprenticeships and a suggested forecast for apprenticeships in Wales, based on demand going forward. The study draws together the findings in the form of a ‘gap analysis’, highlighting the occupations that carry the most risk in terms of skills gaps and shortages. Finally, the report concludes with a series of recommendations, emerging from the evidence base that Welsh stakeholders should consider.

In summary the research will establish an evidence base at a very detailed level that will enable:

- Improved output forecasts by sub-region making evidence ‘more relevant’
- Improved infrastructure investment decision-making in a challenging political climate
- Greater detailed work pipelines that will assist industry in planning across supply-chains
- Welsh sub-regional analysis will support the planning and informing of local employment and training needs as well as curriculum planning and enabling the vision of a higher level of skills attainment for Wales
- An understanding of forward demand that will help to create realistic training and apprenticeship opportunities
- Detailed evidence at this level will support future funding applications for Wales

Producing detailed labour market intelligence at this level is not without problems and any forecasting needs to be viewed as an ‘indicator’ rather than an absolute solution. Dealing with a wide range of different data and smaller sample sizes (from a demand and supply perspective) can cause issue and therefore the approach we have taken is both quantitative and qualitative as it is imperative that we sense check the numbers we produce with stakeholders involved in the sector in Wales.

Finally, we should emphasise that this is the start of the journey in producing this detailed evidence base for Wales. Additional research needs are emerging from the project where we need to look deeper into specific areas such as the mobility of the Welsh construction workforce and the flows of workers into England, plus how some workers are training in construction related occupations but working in other sectors which can create a false impression of the supply of labour.

Additionally, the pipeline analysis is only accurate for a period of time and therefore the evidence base provided will need updating on a regular basis and adding to as we work together to achieve a greater insight into Welsh construction skills.

2. Demand analysis methodology

2.1. Introduction

The Construction Skills Network (CSN) provides labour market intelligence for the construction industry. Developed by Experian on behalf of CITB it forecasts labour demand in each of 12 UK regions and provides details on how the industry will change year on year. It is not designed however to predict labour demand at a sub-regional level. For this purpose, we use our prize-winning Labour Forecasting Tool (LFT) developed on behalf of CITB. Labour demand is calculated by converting the volume of construction activity forecast to take place in any geographical region into forecast labour demand using labour coefficients (the number of person years required to produce £1m of output). For the sake of consistency with ONS terminology the 'volume of activity' is referred to as 'output' throughout this report. The following sections describe:

- the sources of data we use;
- how the output is calculated;
- how we deal with the absence of comprehensive data that is the typical situation beyond the first year or two of our analysis;
- how we reconcile any differences between the results produced by the LFT and those produced by the CSN;
- the steps we take to take account of any shortcomings in the sources of data; and how the LFT converts output into labour demand.

2.2. Calculating construction output

2.2.1. Data sources

There are two principal sources of data: the Glenigan database and the National Infrastructure and Construction Pipeline (NICP). Once we have elicited the appropriate date, the results are sent to the Welsh RSPs to supplement and/or confirm.

2.2.2. Glenigan

The original purpose of the Glenigan database is to allow contractors to identify leads and to carry out construction market analysis. It is updated every quarter to provide details of planning applications from local authorities supplemented with additional project-specific data. Of particular relevance to this report, it provides a description of each project, its name, location, value, and in most cases, projected start and end dates. It contains many tens of thousands of projects. The Glenigan pipeline does not identify every single project in an area: projects which are small (typically but not exclusively those less than £250,000 in value), and most that involve repair and maintenance are not included.

We have used the latest available cut of Glenigan data (2017Q1) including all the relevant projects which started before 2017 but excluding those which are already complete. We have included in our analysis only those projects shown to be at the following planning stages because there is a reasonable probability that these projects will be realised in practice:

- Planning not required
- Detail plans granted
- Reserved matters granted

- Application for reserved matters
- Plans approved on appeal
- Listed building consent

The values of some infrastructure projects given in the Glenigan database are the total value of construction and engineering works. In these cases, since the scope of this study is limited to the construction sector, an estimate of the engineering value has been calculated and subtracted from the total value. This provides what we have termed the construction value. The percentages applied to the total value of each infrastructure project type to derive the construction value are shown in Table 1. The construction/engineering proportions have been validated through work we have undertaken for other clients and have been used in the production of Infrastructure UK's National Infrastructure Plan for Skills and the Construction Skills Network forecasts.

An initial review of the projects in the pipeline is carried out to ensure that only projects which have (a) a defined value and (b) defined start and end dates, are considered in the analysis, and that no projects are duplicated. For example "major leads" and "frameworks" may include smaller projects that are separately identified in the database.

Because of the size of the database, it is impossible to review the details of every project. Instead, we identify the small number of projects that represent the greatest value, the so-called significant projects. To do this, we use the Mean Value Theorem developed at the University of Dundee which states that maximum information from any set of data is obtained simply by considering the data whose value is greater than the average. This is a version of the Pareto rule which suggests that 80% of the value in a data set is contained within the 20% of items whose value is the greatest. The significant projects are then thoroughly inspected to make sure that the information reported in the Glenigan database is consistent and accurate as far as can be ascertained. Any anomalies are resolved, if necessary by returning to the source of the data. Since this process typically picks up the projects whose value represents 80% of the total, the scope for any errors in the remaining data to have a significant impact is severely limited.

Table 1: Proportion of total value related to construction

| Infrastructure type | Sub-type | Construction value as a proportion of total value |
|-------------------------------|---------------------------------------|---|
| Flooding | Flooding | 90% |
| Transport | Bridges | 100% |
| | Road Tunnel | 100% |
| | Roads | 100% |
| | Air Traffic Control | 100% |
| | Airports | 100% |
| | Ports | 90% |
| | Stations (Underground/Network rail) | 80% |
| | Mixed Rail | 55% |
| | Electrification | 35% |
| | Underground/DLR (not incl. Stations) | 35% |
| | Rail maintenance | 10% |
| | Trams | 55% |
| | Contactless Ticketing | 20% |
| Water | Water/Wastewater Treatment Works | 90% |
| Communications | Broadband/Digital infrastructure | 20% |
| Energy | Photovoltaics | 80% |
| | Generation (Biomass) | 50% |
| | Generation (Energy from Waste) | 50% |
| | Generation (Nuclear) | 50% |
| | Undefined Electricity Generation | 40% |
| | Generation (Fossil fuel) | 25% |
| | Generation (Renewables - Offshore) | 20% |
| | Generation (Renewables - Onshore) | 10% |
| | Gas Transmission/distribution | 30% |
| | Electricity transmission/distribution | 25% |
| | Interconnectors | 20% |
| | Nuclear Decommissioning | 60% |
| | Smart Meters | 0% |
| | Oil and Gas | 10% |
| Mining | Mining | 80% |
| General infrastructure | General infrastructure | 100% |

For the significant projects, the project descriptions in the database are thoroughly inspected and assigned the most appropriate project type to be used when the data is input to the LFT (each type is driven by a different underlying model). Cases where a project consists of more than one type are broken down into multiple forecasts which are assigned specific project types to more closely predict the labour demand. This takes account of the different types of work which may exist within a single project, e.g. mixed developments comprising housing, commercial and industrial.

For the non-significant projects, the default project type defined in the Glenigan pipeline is applied.

In order to maintain consistency with the CSN, whose forecasts extend only as far as 2020/21, we have limited our analysis of the Glenigan data to the annual spends up to and including 2020/21.

2.2.3. NICP data

The Infrastructure and Projects Authority (formerly Infrastructure UK and Major Projects Authority) compile a pipeline of UK infrastructure and construction projects and the associated annual public and private investment. For this report we have used the autumn 2016 NICP which includes details of around 720 projects valued at some £500bn.

The NICP data is examined to identify infrastructure projects or programmes of work taking place in Wales that are not included in the Glenigan database. The construction cost is calculated from the total cost reported in the NICP using the percentages in Table 1. Projects in the Glenigan dataset and the NICP are combined (ensuring that there is no double counting) to create a pipeline of 'denominated' projects for the area. We have only considered those projects which are specifically allocated to Wales in the NICP (i.e. projects at a National level have not been considered).

The autumn 2016 pipeline includes both construction and infrastructure projects but for the purposes of this analysis we have included only projects which are clearly defined specific projects rather than regional programmes of work. This reduces the risk of double counting with data in Glenigan.

2.2.4. CSN data

The CSN model produced by Experian also uses Glenigan as a major source of data relating to the volume of construction activity in the UK. Experian supplement the Glenigan data with market intelligence collected by a variety of means including a series of 'Observatories' held every six months in each region, at which representatives of the industry are invited to comment on the validity of Experian's data and findings. In Experian's annual CSN report, their estimate of the output in each of the following sectors is published:

- Public housing
- Private housing
- Infrastructure
- Public non-housing
- Industrial
- Commercial
- Housing repair and maintenance
- Non-housing repair and maintenance

2.2.5. Validation by the Welsh RSPs

Finally, the resulting pipeline of work is forwarded to the Welsh RSPs who check its validity and identify any omissions or other issues.

2.3. Aligning the Glenigan pipeline with CSN output

The following process is undertaken to ensure that the value of work in the Glenigan pipeline is aligned with output as measured by the CSN.

1. Considering the government region within which the RSP lies (in this case, Wales), identify only the new build in the denominated projects by removing all repair and maintenance projects.
2. Compare the output identified in the denominated projects as new build at the regional level with the CSN new build at the regional level sector by sector e.g. residential, non-residential, infrastructure etc.
3. If in any sector the denominated new-build regional output for the peak year is more or less than that forecast by the CSN for the same year then the value of **each new build denominated project** is factored by the following ratio:

$$\frac{\text{Value of CSN new build at regional level for given sector}}{\text{Value of denominated new build projects at regional level for given sector}}$$

The outputs calculated in this way are referred to as ‘factored new build outputs’

This process takes account of both projects (typically less than £250k in value) not included in the denominated projects and those whose value or probability of realisation is over-optimistic.

4. To take account of housing repair and maintenance (R&M) in the denominated projects at the LEP level, it is assumed that the proportion of the total output represented by housing R&M is the same at the LEP level as it is at the regional level in the CSN. The Glenigan new build factored output is therefore multiplied by the following ratio:

$$\frac{\text{Value of CSN housing R\&M at regional level}}{\text{Value of CSN new build housing at regional level}}$$

to derive the output in housing R&M to be added to the factored new build output

5. The non-housing R&M to be added to the factored new build output is calculated in a similar way.

This ensures that the total value of work in both new build and R&M sectors being included in the analysis is the same as the CSN forecast.

2.4. Dealing with the ‘cliff edge’

As the time horizon extends there is less clarity on what is planned. As a result, the number of denominated projects declines the further into the future we look. This apparently declining workload is highly unlikely to reflect the total amount of work that will take place in the future. It is almost certain that there will be additional projects that come on stream which are yet to be identified. To overcome this ‘cliff edge’ effect we assume based on an analysis of historical data, that the future workforce is approximately equal to the peak. It should be noted that the peak labour demand refers to the current “snapshot” of the scheduled construction spend. It is prudent to expect that, should the investment in future years follow the same pattern, the peak labour demand figures are likely to be roughly similar assuming the mix of projects remains consistent. The peak has, therefore, been projected forwards and backcast to create a more likely scenario of the ongoing workforce. The employment growth rate is based on the CSN employment forecast for the whole region under consideration.

A consequence of this approach is the implicit assumption that the proportion of people in each occupation in the additional projects remains unchanged year on year.

2.5. Calculating total labour demand

Our Labour Forecasting Tool is used to determine the labour demand generated by the construction outputs in the peak year calculated as described in Sections 2.2 and 2.4. The LFT can determine the labour demand generated by a pipeline of construction projects given only the project types, their start and end dates and their locations. It quantifies the month-by-month demand in each of the 28 occupational groups shown in Appendix A. To do this, it uses labour coefficients (person years to produce £1m of output) derived from historical ONS data. The labour coefficients are updated annually as new data becomes available, and indexed to take account of changes in prices.

There are different labour coefficients for each occupation and for each of the following project types:

- residential
- non-residential
- infrastructure
- residential R&M
- non-residential R&M

Infrastructure projects can be broken down into the types shown in Table 1.

3. Labour demand in North Wales

3.1. Introduction

The following sections provide an estimate of the labour demand that construction investment will create across North Wales (as defined in Figure 1 and Table 2) over the period 2017-2021. They report the outputs determined from the analysis described in Section 1 and the labour demand they generate as calculated by the Labour Forecasting Tool.

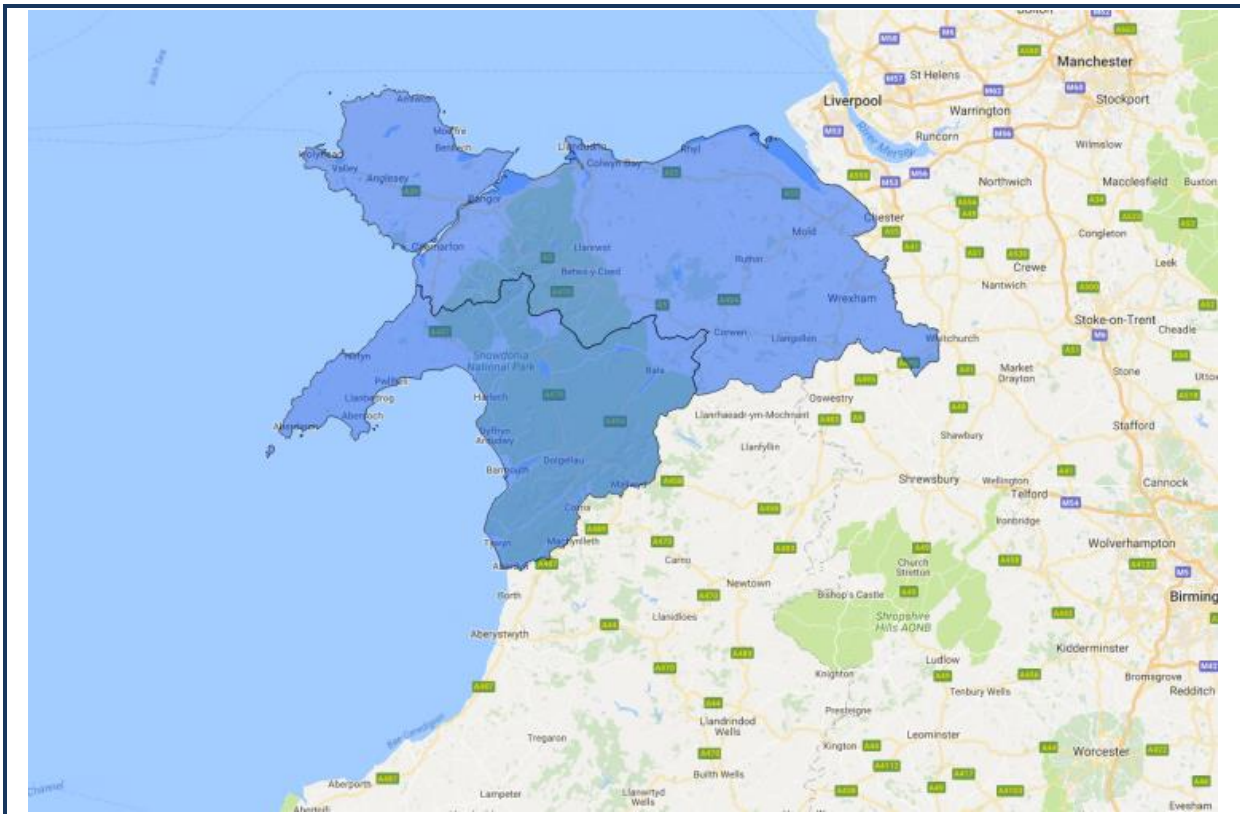


Figure 1: Map of North Wales and surrounding areas

Table 2: Local authorities analysed in the research

| | Local Authority |
|-------------|------------------|
| North Wales | Conwy |
| | Denbighshire |
| | Flintshire |
| | Gwynedd |
| | Isle of Anglesey |
| | Wrexham |

3.2. Pipeline of denominated projects

3.2.1. Glenigan pipeline analysis

The initial review of the Glenigan database identified 280 projects in the North Wales area. Of these, 2 projects were removed because there was no value provided, and 29 were removed due to missing dates. Also excluded were 3 projects which were clearly identified as consultancy. A full set of the projects which were omitted from the analysis is provided in Appendix B. It is possible that this work will take place at some undefined point in the future but as dates are unknown it is most likely that this will be later in the forecast period. Since dates are not known it is not possible to pinpoint when the labour will be required, but an assessment of the labour demand is made in the estimates of other work from the additional projects.

The Mean Value Theorem was applied to the remainder of the pipeline to identify the significant projects. The process identified 28 significant projects accounting for 91% of the total construction spend in the area. This allowed a detailed analysis of a large proportion of all the projects and a comprehensive consideration of the project types to which they were assigned.

Table 3 shows the number of significant projects within the North Wales area, the percentage of spend arising from the significant projects and the total spend. The construction spend shown in this table takes account of any adjustments for engineering works and any incomplete, duplicate or consultancy projects. Values are shown in 2017 prices, the base price used in the Glenigan database.

Table 3: Key data for significant projects in Glenigan¹

| | Number of projects | Construction spend (£m – 2017 values) |
|--|--------------------|---------------------------------------|
| All Glenigan projects | 246 | 7,439 |
| Significant Glenigan projects | 28 | 6,785 |
| Percentage within significant projects | 11% | 91% |

Appendix E provides a full breakdown of the significant projects and their construction values. The peak year for the Glenigan spend profile is 2017. The location of the significant projects within North Wales can be seen in Figure 2. The radius of the markers is proportional to the value of the work taking place.

¹ The values in this table are the values from the Glenigan pipeline to which the construction element percentage has been applied and thus reflect the adjusted values of infrastructure projects values to distinguish between construction and engineering construction.

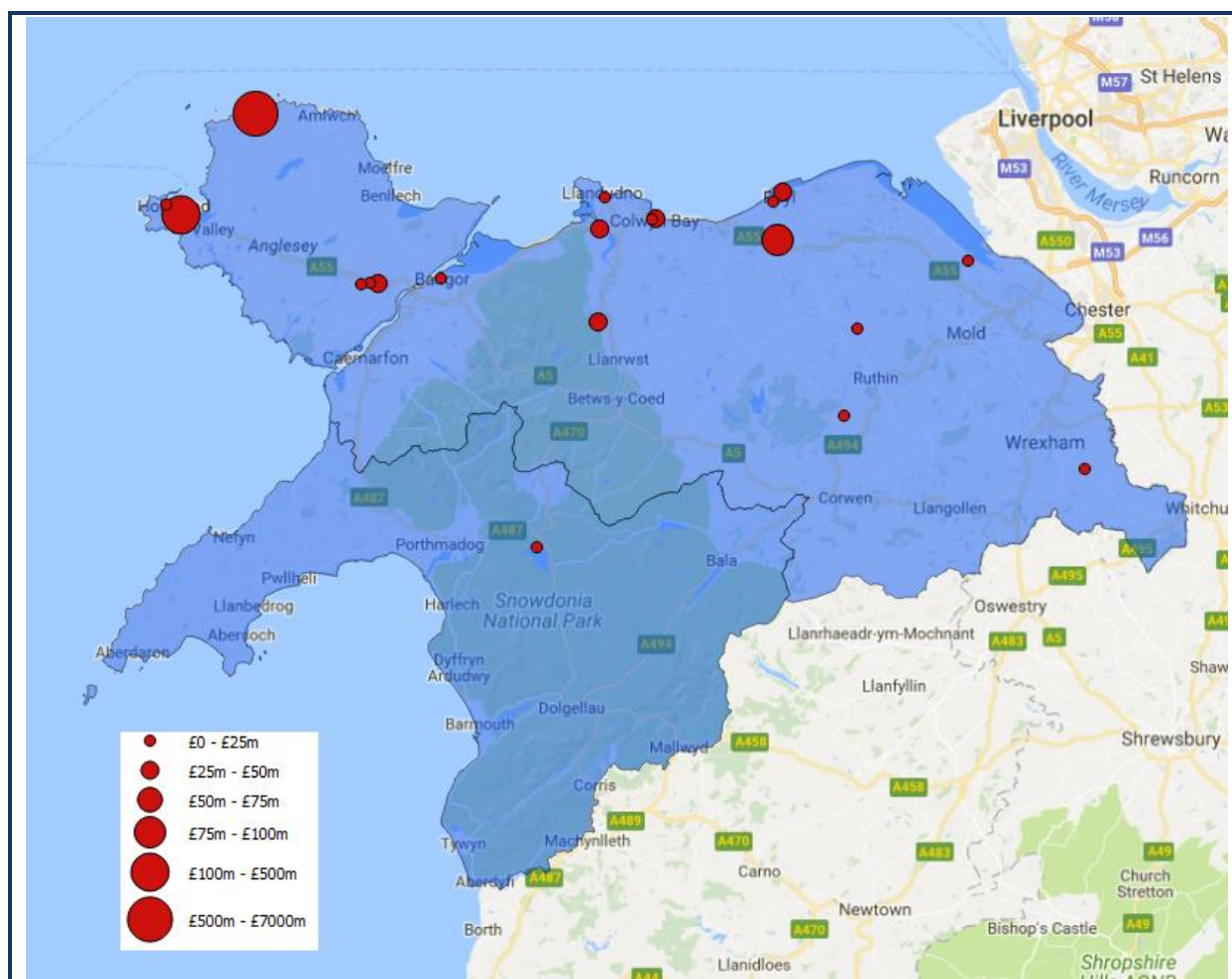


Figure 2: Location of significant projects included in the analysis

3.2.2. Glenigan & NICP spend analysis

Implementing the methodology outlined in Section 1 leads to the following findings for the peak year for denominated projects of 2017. The peak year is used because the tail off in the denominated projects is more likely to be due to a lack of future planning rather than an actual tail off in workload.

Table 4 shows the distribution by sector of new build spend for the total pipeline of denominated projects.

Table 4: New-build construction spend by project type in 2017 (total denominated project pipeline)

| Project Type | Construction spend in 2017 (2017 values - £m) | % of total |
|---------------------------|---|-------------|
| Infrastructure | 275 | 46% |
| New Housing | 122 | 21% |
| Private Commercial | 85 | 14% |
| Public Non-housing | 83 | 14% |
| Private Industrial | 30 | 5% |
| Total | 595 | 100% |

Table 5 shows the infrastructure construction spend from both Glenigan and the NICP in 2017. by sub-sector.

Table 5: Construction spend per infrastructure sub-type in 2017 (total denominated project pipeline)

| Project Type | Construction spend in 2017 (2017 values - £m) | % of total |
|-------------------------------|---|------------|
| Energy | 149 | 54% |
| Transport | 58 | 21% |
| Water | 54 | 20% |
| General Infrastructure | 7 | 2% |
| Flooding | 4 | 1% |
| Communications | 2 | 1% |
| Total | 275 | 100% |

3.3. Estimate of future total labour demand

As outlined in the Section 1 the denominated project pipeline may not include smaller projects or repair and maintenance work. Figure 3 shows the outcomes of the analysis of future labour demand with an employment growth rate included. The solid blue area shows the labour demand arising from the new build Glenigan and NICP projects. Any R&M included in Glenigan or the NICP is also shown. The red shaded area shows the likely total labour demand arising from estimates of other work. The total construction labour demand including the volume of R&M imputed from the CSN model peaks for the area in 2021 at 23,600.

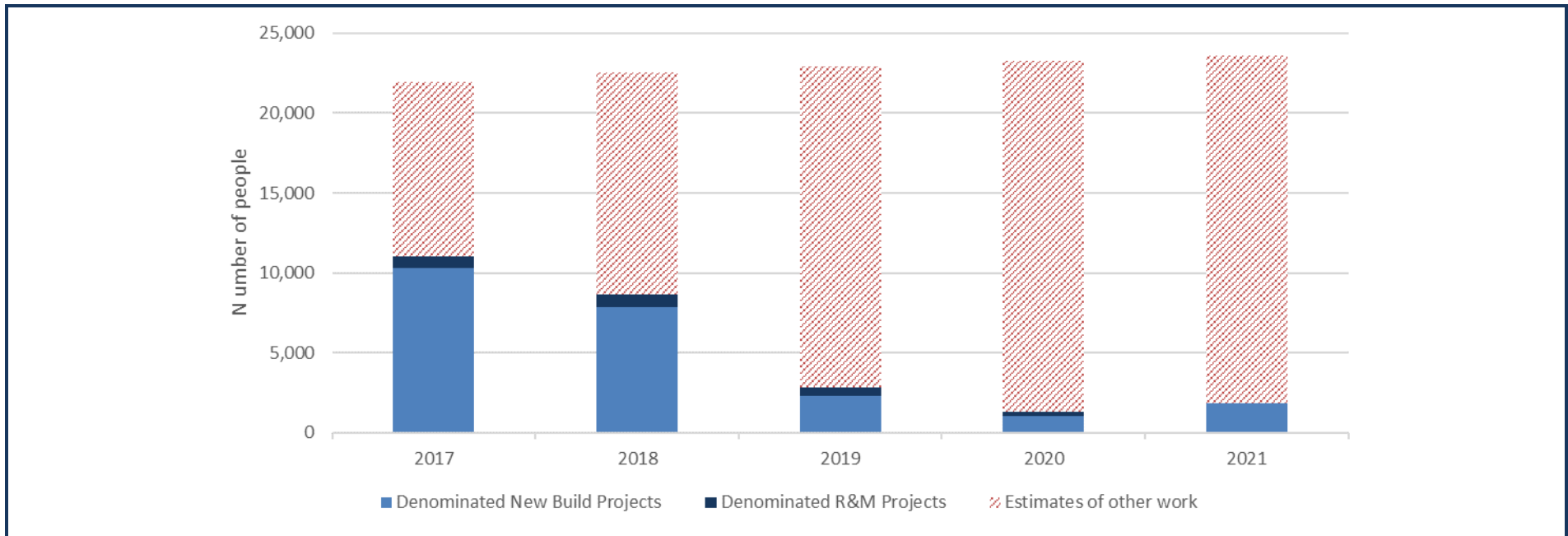


Figure 3: Total construction labour demand including estimates for both R&M and estimates of other work

3.3.1. Breakdown of labour demand by occupation

For the peak year in Glenigan of 2017 the detailed breakdown by each of the 28 occupational groups for the Glenigan and the NICP projects is shown in Figure 4. This shows the breakdown by occupation for both the pipeline of denominated projects and the estimates of other work.

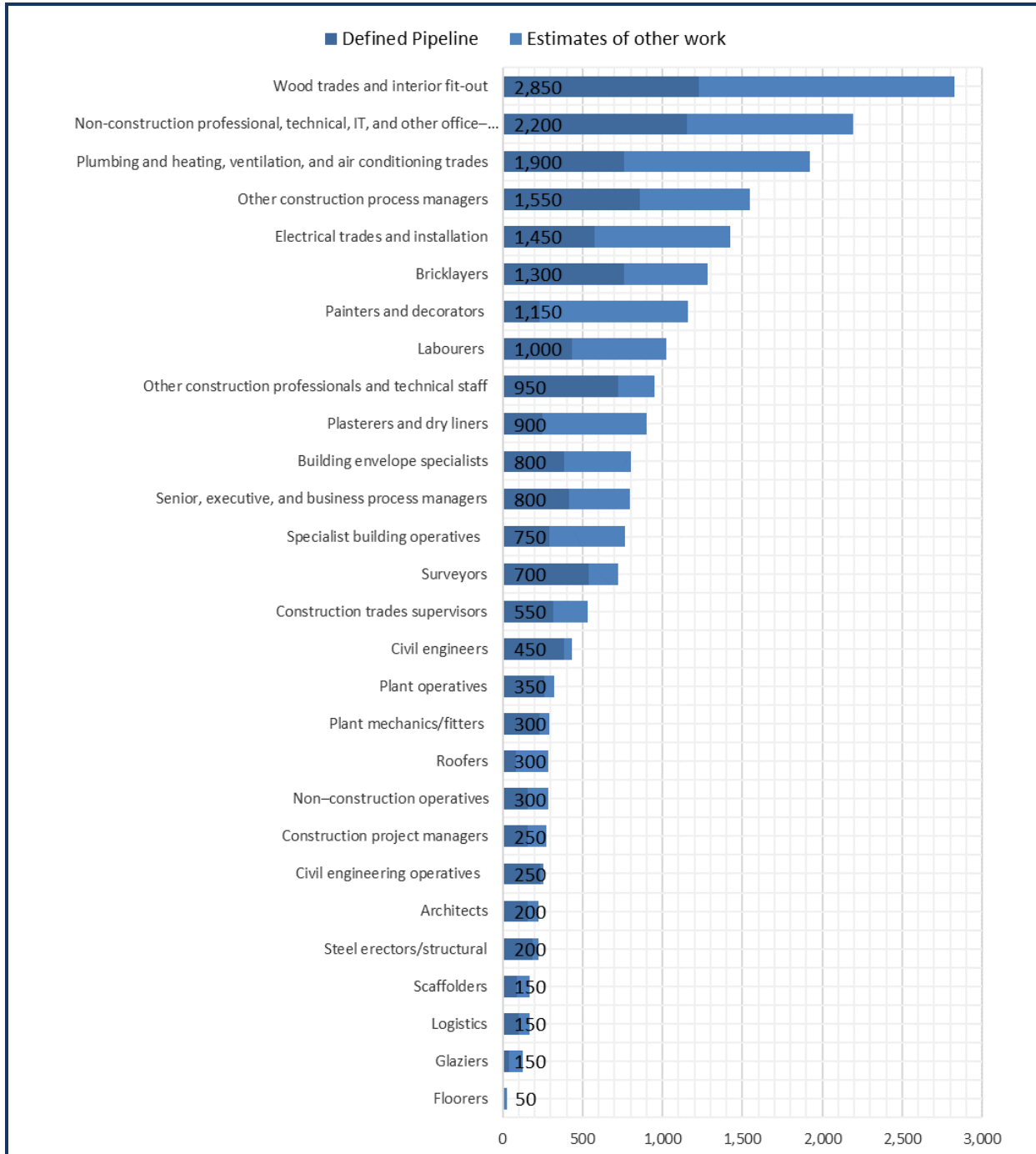


Figure 4: Construction labour demand by occupation in the peak year

3.3.2. Breakdown of labour demand by project type

Table 6 shows the labour demand generated by the denominated projects and the estimates of other work in 2017.

Table 6: Labour demand by work type in 2017

| Project Type | Labour demand from denominated projects (People) | Labour demand from estimates of other work (People) | Total labour demand (People) | % of total |
|--------------------|--|---|------------------------------|-------------|
| Non-housing R&M | 100 | 4,750 | 4,850 | 22% |
| Housing R&M | 600 | 3,800 | 4,400 | 20% |
| New Housing | 2,300 | 1,500 | 3,800 | 17% |
| Infrastructure | 3,200 | - | 3,200 | 15% |
| Private Commercial | 2,100 | 850 | 2,950 | 13% |
| Public Non-housing | 2,000 | - | 2,000 | 9% |
| Private Industrial | 750 | - | 750 | 3% |
| Total | 11,050 | 10,900 | 21,950 | 100% |

3.4. Summary of demand

- The analysis of the labour demand arising from the construction spend in North Wales is about 22,000 people in 2017, taking account of estimates of other work including R&M in addition to the denominated project pipeline of projects.
- During 2017, the peak year of the denominated pipeline demand, the most labour-intensive non-manual occupation group is “non-construction professional, technical, IT and other office-based staff” with an annual demand of 2,200 people.
- The estimate of labour demand for the trade occupations for the peak year of 2017 are as follows:
 - The trade occupation for which demand is highest is “Wood trades and interior fit-out” with 2,850 people;
 - “Plumbing and heating, ventilation, and air conditioning trades” rank third, with a demand of 1,900 people; and
 - “Electrical trades and installation” trades follow with 1,450 people.

4. Labour demand in South East Wales

4.1. Introduction

The following sections provide an estimate of the labour demand that construction investment will create across South East Wales (as defined in Figure 5 and Table 7) over the period 2017-2021. They report the outputs determined from the analysis described in Section 2 and the labour demand they generate as calculated by the Labour Forecasting Tool.



Figure 5: Map of South East Wales and surrounding areas

Table 7: Local authorities analysed in the research

| | Local Authority |
|------------------|-------------------|
| South East Wales | Blaenau Gwent |
| | Bridgend |
| | Caerphilly |
| | Cardiff |
| | Merthyr Tydfil |
| | Monmouthshire |
| | Newport |
| | Rhondda Cynon Taf |
| | Torfaen |
| | Vale of Glamorgan |

4.2. Pipeline of denominated projects

4.2.1. Glenigan pipeline analysis

The initial review of the Glenigan database identified 556 projects in South East Wales area. Of these, 52 projects were removed due to missing dates. Also excluded were 3 projects which were clearly identified as consultancy projects. A full set of the projects which were omitted from the analysis is provided in Appendix C. It is possible that this work will take place at some undefined point in the future but as dates are unknown it is most likely that this will be later in the forecast period. Since dates are not known it is not possible to pinpoint when the labour will be required, but an assessment of the labour demand is made in the estimates of other work from the additional projects.

The Mean Value Theorem was applied to the remainder of the pipeline to identify the significant projects. The process identified 86 significant projects accounting for 85% of the total construction spend in the area. This allowed a detailed analysis of a large proportion of all the projects and a comprehensive consideration of the project types to which they were assigned.

Table 8 shows the number of significant projects within South East Wales area, the percentage of spend arising from the significant projects and the total spend. The construction spend shown in this table takes account of any adjustments for engineering works and any incomplete, duplicate or consultancy projects. Values are shown in 2017 prices, the base price used in the Glenigan database.

Table 8: Key data for significant projects in Glenigan²

| | Number of projects | Construction spend (£m – 2017 values) |
|--|--------------------|---------------------------------------|
| All Glenigan projects | 501 | 9,189 |
| Significant Glenigan projects | 86 | 7,765 |
| Percentage within significant projects | 17% | 85% |

Appendix F provides a full breakdown of the significant projects and their construction values. The peak year for the Glenigan spend profile is 2017. The location of the significant projects within South East Wales can be seen in Figure 6. The radius of the markers is proportional to the value of the work taking place.

² The values in this table are the values from the Glenigan pipeline to which the construction element percentage has been applied and thus reflect the adjusted values of infrastructure projects values to distinguish between construction and engineering construction.

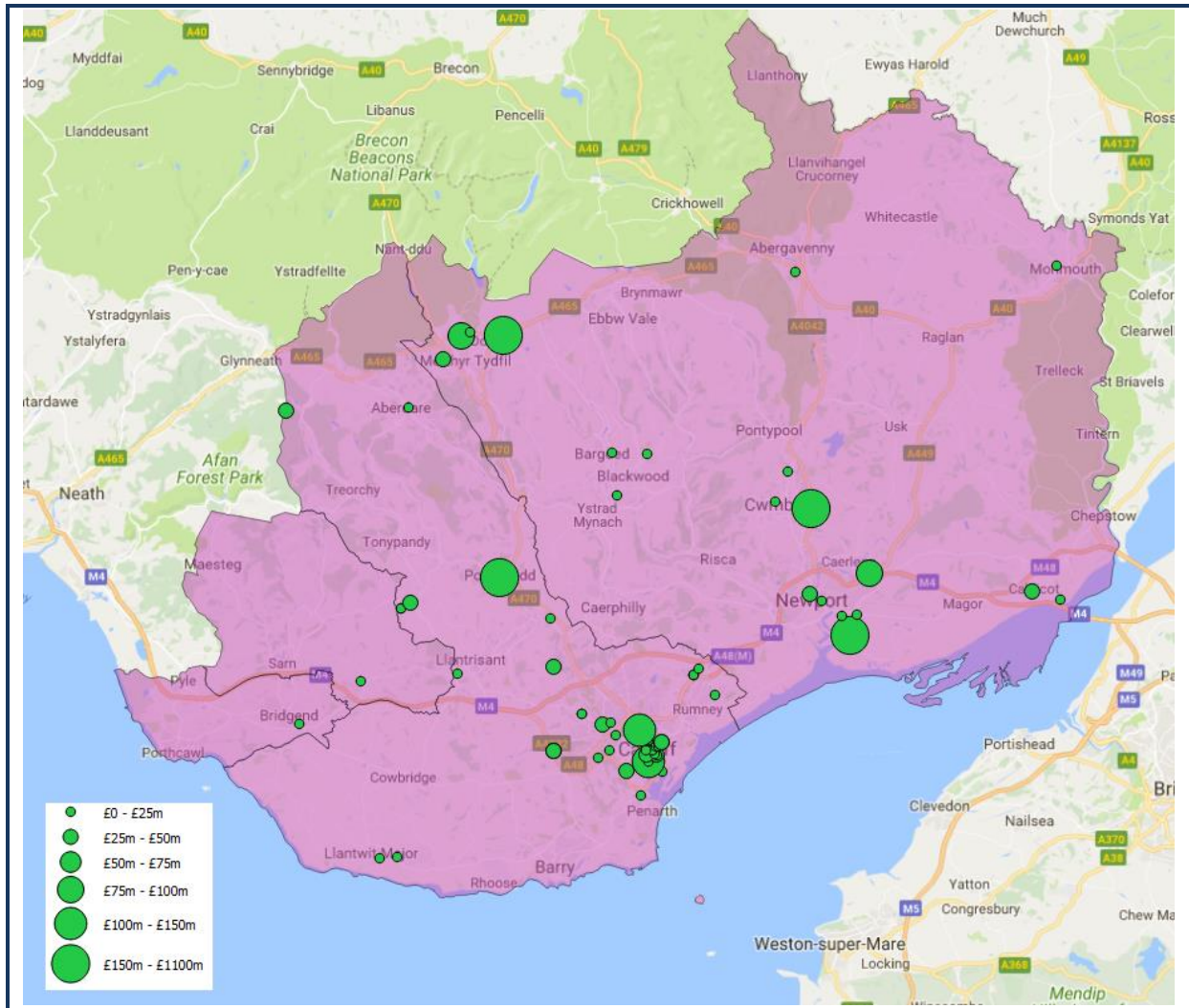


Figure 6: Location of significant projects included in the analysis

4.2.2. Glenigan & NICE spend analysis

Implementing the methodology outlined in Section 1 leads to the following findings for the peak year for denominated projects of 2017. The peak year is used because the tail off in the denominated projects is more likely to be due to a lack of future planning rather than an actual tail off in workload.

Table 9 shows the distribution by sector of new build spend for the total pipeline of denominated projects.

Table 9: New-build construction spend by project type in 2017 (total denominated project pipeline)

| Project Type | Construction spend in 2017 (2016 values - £m) | % of total |
|---------------------------|---|-------------|
| Infrastructure | 457 | 31% |
| New Housing | 348 | 24% |
| Public Non-housing | 345 | 24% |
| Private Commercial | 265 | 18% |
| Private Industrial | 47 | 3% |
| Total | 1,462 | 100% |

Table 10 shows the infrastructure construction spend from both Glenigan and the NICP in 2017 by sub-sector.

Table 10: Construction spend per infrastructure sub-type in 2017 (total denominated project pipeline)

| Project Type | Construction spend in 2017 (2016 values - £m) | % of total |
|-------------------------------|---|-------------|
| Energy | 197 | 43% |
| Transport | 128 | 28% |
| Water | 92 | 20% |
| General Infrastructure | 20 | 4% |
| Flooding | 15 | 3% |
| Communications | 5 | 1% |
| Total | 457 | 100% |

4.3. Estimate of future total labour demand

As outlined in the Section 1 the denominated project pipeline may not include smaller projects or repair and maintenance work. Figure 7 shows the outcomes of the analysis of future labour demand with an employment growth rate included. The solid blue area shows the labour demand arising from the new build Glenigan and NICP projects. Any R&M included in Glenigan or the NICP is also shown. The red shaded area shows the likely total labour demand arising from estimates of other work. The total construction labour demand including the volume of R&M imputed from the CSN model peaks for the area in 2021 at 63,150.

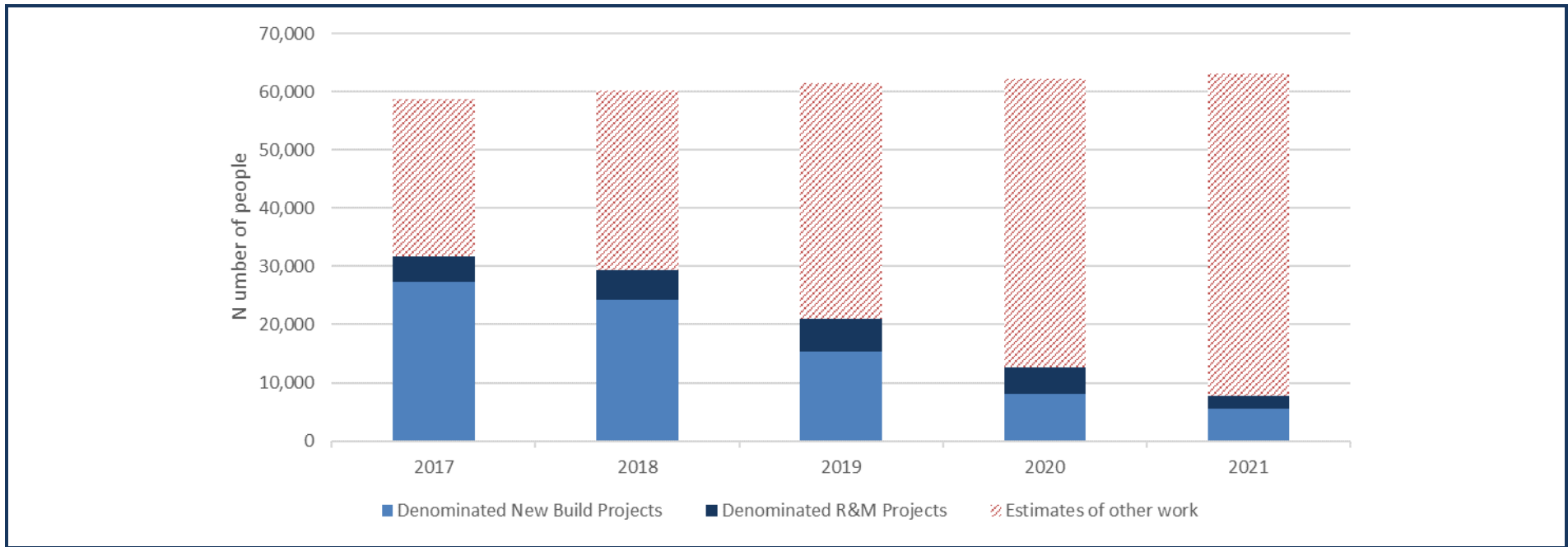


Figure 7: Total construction labour demand including estimates for both R&M and estimates of other work

4.3.1. Breakdown of labour demand by occupation

For the peak year in Glenigan of 2017 the detailed breakdown by each of the 28 occupational groups for the Glenigan and the NICP projects is shown in Figure 8. This shows the breakdown by occupation for both the pipeline of denominated projects and the estimates of other work.

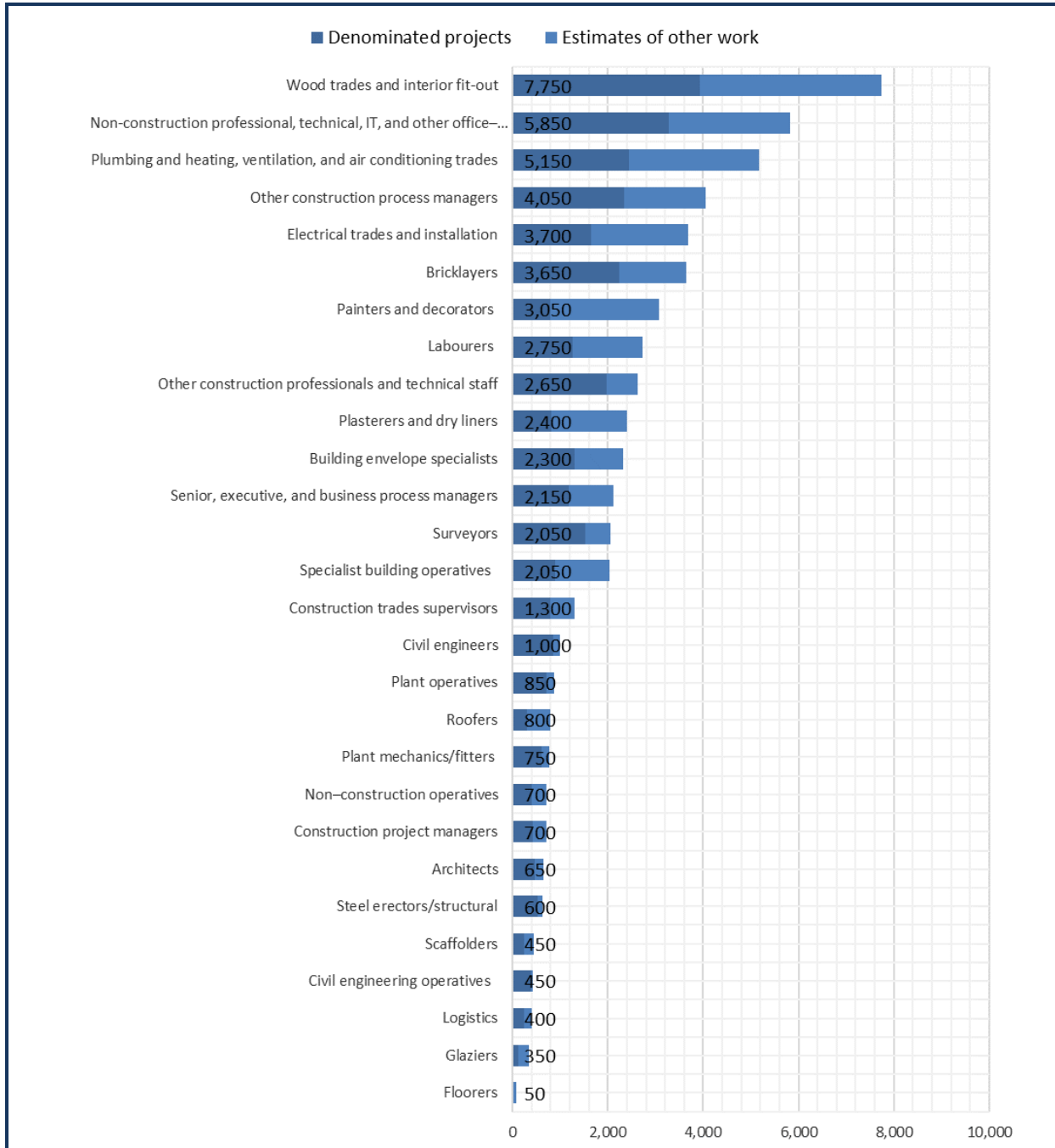


Figure 8: Construction labour demand by occupation in the peak year

4.3.2. Breakdown of labour demand by project type

Table 11 shows the labour demand generated by the denominated projects and the estimates of other work in 2017.

Table 11: Labour demand by work type in 2017

| Project Type | Labour demand from denominated projects (People) | Labour demand from estimates of other work (People) | Total labour demand (People) | % of total |
|--------------------|--|---|------------------------------|-------------|
| Housing R&M | 4,350 | 8,300 | 12,650 | 22% |
| Non-housing R&M | 100 | 11,500 | 11,600 | 20% |
| New Housing | 6,350 | 4,350 | 10,700 | 18% |
| Private Commercial | 6,450 | 2,700 | 9,150 | 16% |
| Public Non-housing | 8,250 | - | 8,250 | 14% |
| Infrastructure | 5,150 | - | 5,150 | 9% |
| Private Industrial | 1,200 | - | 1,200 | 2% |
| Total | 31,850 | 26,850 | 58,700 | 100% |

4.4. Summary of demand

- The analysis of the labour demand arising from the construction spend in South East Wales is around 58,700 people in 2017, taking account of estimates of other work including R&M in addition to the denominated project pipeline of projects.
- During 2017, the peak year of the denominated pipeline demand, the most labour-intensive non-manual occupation group is “non-construction professional, technical, IT and other office-based staff” with an annual demand of 5,850 people.
- The estimate of labour demand for the trade occupations for the peak year of 2017 are as follows:
 - The trade occupation for which demand is highest is “Wood trades and interior fit-out” with 7,750 people;
 - “Plumbing and heating, ventilation, and air conditioning trades” rank third, with a demand of 5,150 people; and
 - “Electrical trades and installation” trades follow with 3,700 people.

5. Labour demand in the South West & Mid Wales

5.1. Introduction

The following sections provide an estimate of the labour demand that construction investment will create across the South West & Mid Wales (as defined in Figure 9 and Table 12) over the period 2017-2021. They report the outputs determined from the analysis described in Section 2 and the labour demand they generate as calculated by the Labour Forecasting Tool.

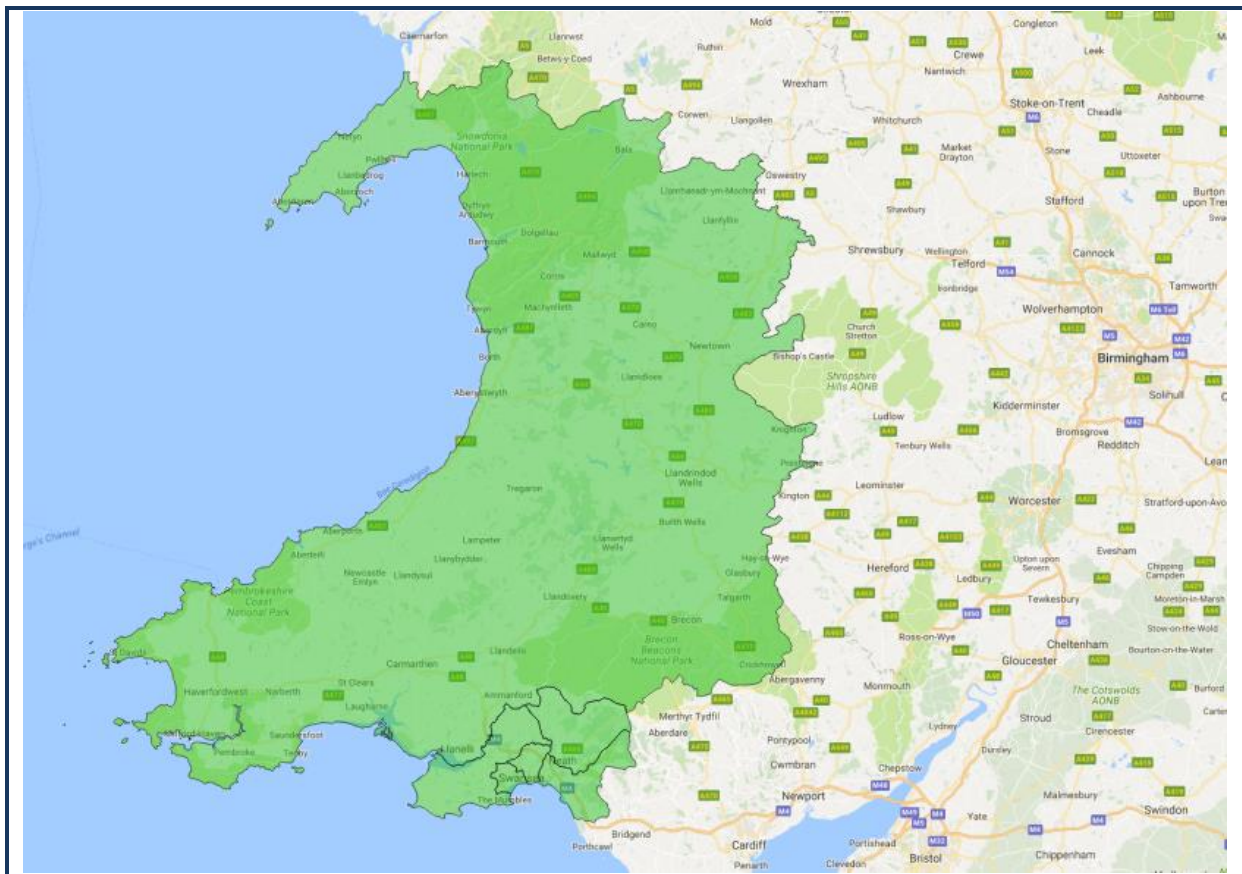


Figure 9: Map of South West and Mid Wales

Table 12: Local authorities analysed in the research

| | Local Authority |
|--------------------------|-------------------|
| South West and Mid Wales | Carmarthenshire |
| | Ceredigion |
| | Neath Port Talbot |
| | Pembrokeshire |
| | Powys |
| | Swansea |

5.2. Pipeline of denominated projects

5.2.1. Glenigan pipeline analysis

The initial review of the Glenigan database identified 544 projects in the South West & Mid Wales area. Of these, 72 were removed due to missing values, and one due to missing dates. Also excluded were one project which was clearly identified as consultancy projects. A full set of the projects which were omitted from the analysis is provided in Appendix D. It is possible that this work will take place at some undefined point in the future but as dates are unknown it is most likely that this will be later in the forecast period. Since dates are not known it is not possible to pinpoint when the labour will be required, but an assessment of the labour demand is made in the estimates of other work from the additional projects.

The Mean Value Theorem was applied to the remainder of the pipeline to identify the significant projects. The process identified 105 significant projects accounting for 80% of the total construction spend in the area. This allowed a detailed analysis of a large proportion of all the projects and a comprehensive consideration of the project types to which they were assigned.

Table 13 shows the number of significant projects within the South West & Mid Wales area, the percentage of spend arising from the significant projects and the total spend. The construction spend shown in this table takes account of any adjustments for engineering works and any incomplete, duplicate or consultancy projects. Values are shown in 2017 prices, the base price used in the Glenigan database.

Table 13: Key data for significant projects in Glenigan³

| | Number of projects | Construction spend (£m – 2016 values) |
|--|--------------------|---------------------------------------|
| All Glenigan projects | 470 | 3,502 |
| Significant Glenigan projects | 105 | 2,802 |
| Percentage within significant projects | 22% | 80% |

Appendix G provides a full breakdown of the significant projects and their construction values. The peak year for the Glenigan spend profile is 2017. The location of the significant projects within the South West & Mid Wales can be seen in Figure 10. The radius of the markers is proportional to the value of the work taking place.

³ The values in this table are the values from the Glenigan pipeline to which the construction element percentage has been applied and thus reflect the adjusted values of infrastructure projects values to distinguish between construction and engineering construction.

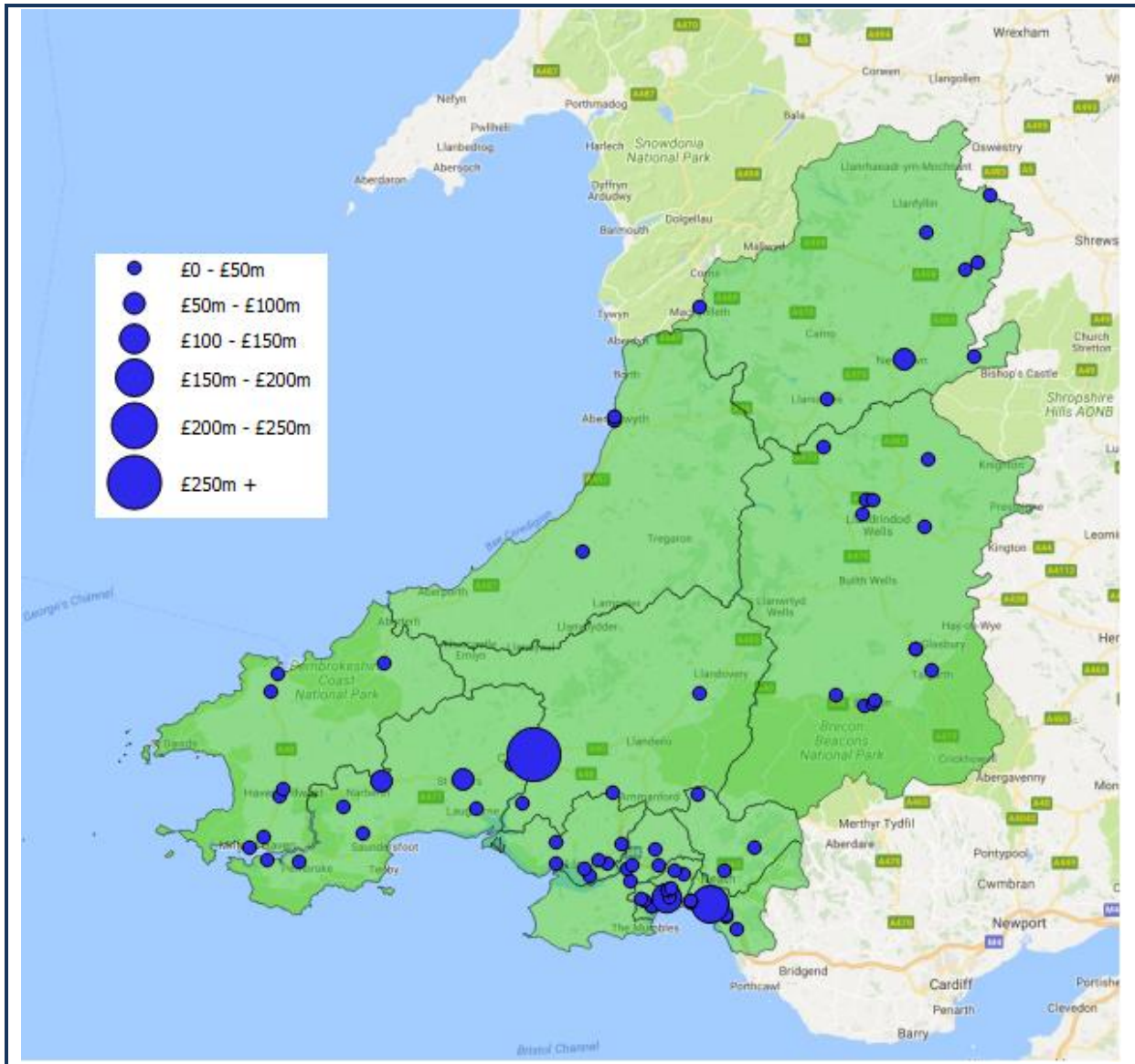


Figure 10: Location of significant projects included in the analysis

5.2.2. Glenigan & NICP spend analysis

Implementing the methodology outlined in Section 1 leads to the following findings for the peak year for denominated projects of 2017. The peak year is used because the tail off in the denominated projects is more likely to be due to a lack of future planning rather than an actual tail off in workload.

Table 14 shows the distribution by sector of new build spend for the total pipeline of denominated projects.

Table 14: New-build construction spend by project type in 2017 (total denominated project pipeline)

| Project Type | Construction spend in 2017 (2016 values - £m) | % of total |
|---------------------------|---|-------------|
| Infrastructure | 313 | 42% |
| New Housing | 158 | 21% |
| Public Non-Housing | 120 | 16% |
| Private Commercial | 83 | 11% |
| Private Industrial | 79 | 10% |
| Total | 753 | 100% |

Table 15 shows the infrastructure construction spend from both Glenigan and the NICP in 2017, by sub-sector.

Table 15: Construction spend per infrastructure sub-type in 2017 (total denominated project pipeline)

| Project Type | Construction spend in 2017 (2016 values - £m) | % of total |
|------------------------|---|-------------|
| Energy | 138 | 44% |
| Transport | 59 | 19% |
| Water | 55 | 18% |
| General Infrastructure | 50 | 16% |
| Flooding | 6 | 2% |
| Communications | 3 | 1% |
| Mining | 1 | 0% |
| Total | 313 | 100% |

5.3. Estimate of future total labour demand

As outlined in the Section 1 the denominated project pipeline may not include smaller projects or repair and maintenance work. *Figure 11* shows the outcomes of the analysis of future labour demand with an employment growth rate included. The solid blue area shows the labour demand arising from the new build Glenigan and NICP projects. Any R&M included in Glenigan or the NICP is also shown. The red shaded area shows the likely total labour demand arising from estimates of other work. The total construction labour demand including the volume of R&M imputed from the CSN model peaks for the area in 2021 at 29,900.

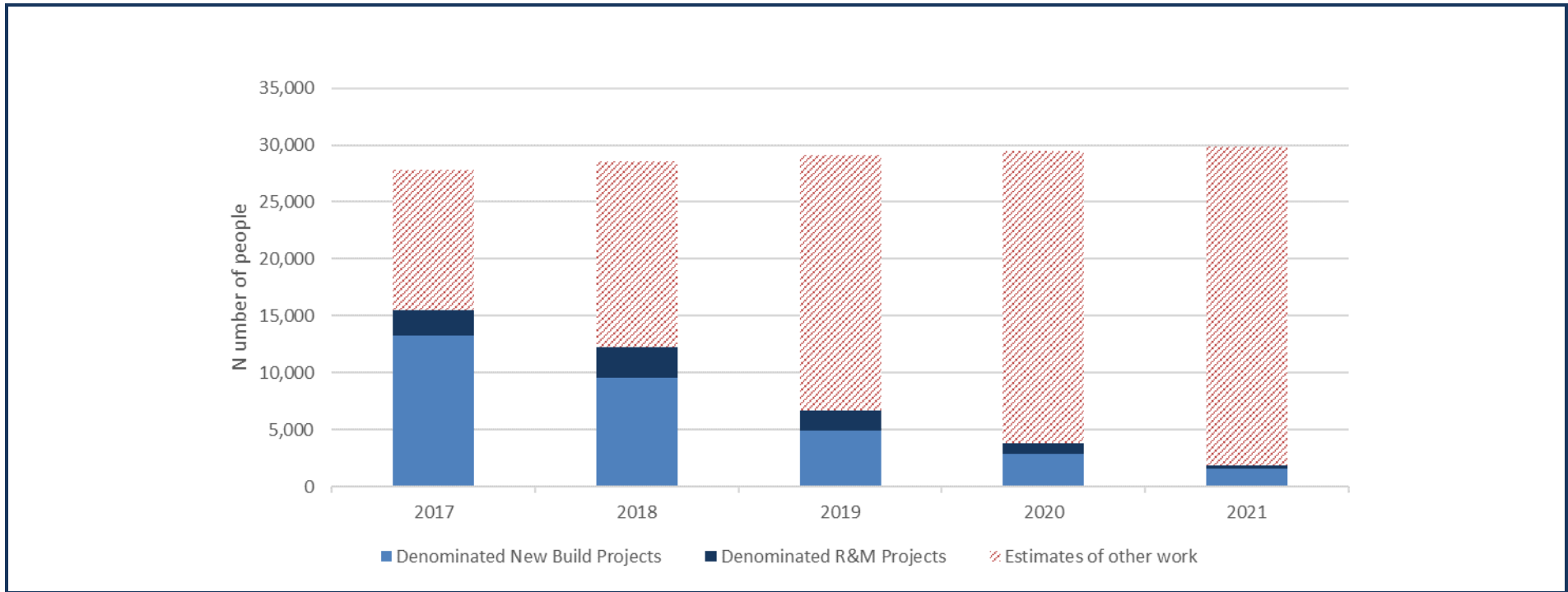


Figure 11: Total construction labour demand including estimates for both R&M and estimates of other work

5.3.1. Breakdown of labour demand by occupation

For the peak year in Glenigan of 2017 the detailed breakdown by each of the 28 occupational groups for the Glenigan and the NICP projects is shown in *Figure 12*. This shows the breakdown by occupation for both the pipeline of denominated projects and the estimates of other work.

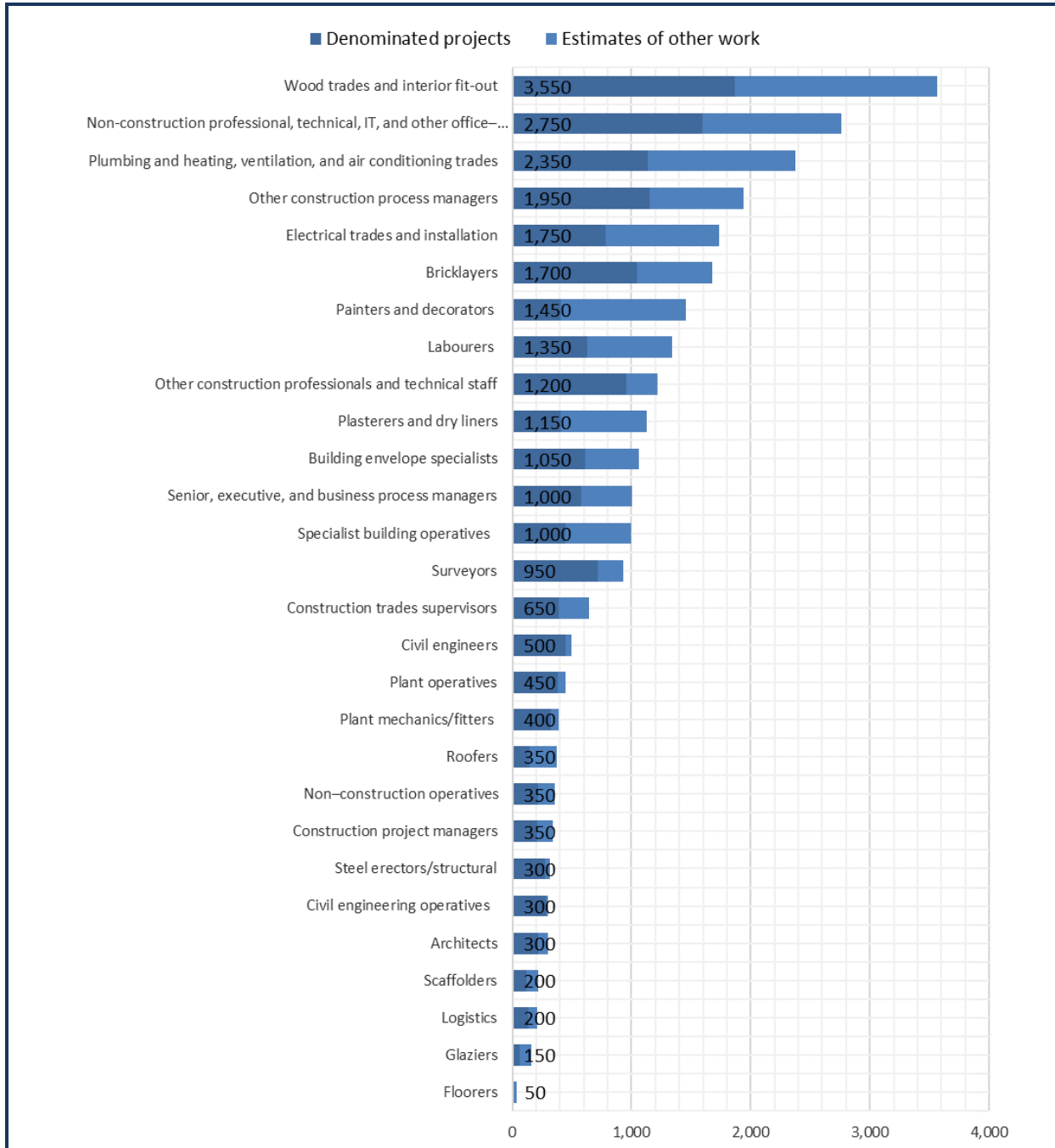


Figure 12: Construction labour demand by occupation in the peak year

5.3.2. Breakdown of labour demand by project type

Table 16 shows the labour demand generated by the denominated projects and the estimates of other work in 2017.

Table 16: Labour demand by work type in 2017

| Project Type | Labour demand from denominated projects (People) | Labour demand from estimates of other work (People) | Total labour demand (People) | % of total |
|--------------------|--|---|------------------------------|-------------|
| Non-housing R&M | 0 | 6000 | 6,000 | 22% |
| Housing R&M | 2300 | 3450 | 5,750 | 21% |
| New Housing | 2900 | 2000 | 4,900 | 18% |
| Infrastructure | 3350 | 0 | 3,350 | 12% |
| Public Non-housing | 2950 | 0 | 2,950 | 11% |
| Private Commercial | 2050 | 850 | 2,900 | 10% |
| Private Industrial | 2000 | 0 | 2,000 | 7% |
| Total | 15,550 | 12,300 | 27,850 | 100% |

5.4. Summary of demand

- The analysis of the labour demand arising from the construction spend in South West and Mid Wales is about 27,850 people in 2017, taking account of estimates of other work including R&M in addition to the denominated project pipeline of projects.
- During 2017, the peak year of the denominated pipeline demand, the most labour-intensive non-manual occupation group is “non-construction professional, technical, IT and other office-based staff” with an annual demand of 2,750 people.
- The estimate of labour demand for the trade occupations for the peak year of 2017 are as follows:
 - The trade occupation for which demand is highest is “Wood trades and interior fit-out” with 3,550 people;
 - “Plumbing and heating, ventilation, and air conditioning trades” rank third, with a demand of 2,350 people; and
 - “Electrical trades and installation” trades follow with 1,750 people.

6. Wales Combined



Figure 13: Map of Wales by RSP area including surrounding areas

6.1. Estimate of total labour demand

As outlined in the methodology, the denominated project pipeline may not include smaller projects or repair and maintenance work. This section shows the outcomes of the analysis which includes the total construction labour demand with an employment growth rate included. This output is shown in Figure 14. The solid blue area shows the labour demand arising from the Glenigan and NICP projects including any R&M included in Glenigan or the NICP. The red shaded area shows the likely total labour demand arising from estimates of other work. The total construction labour demand including the volume of R&M imputed from the CSN model peaks for the area in 2021 at 95,600.

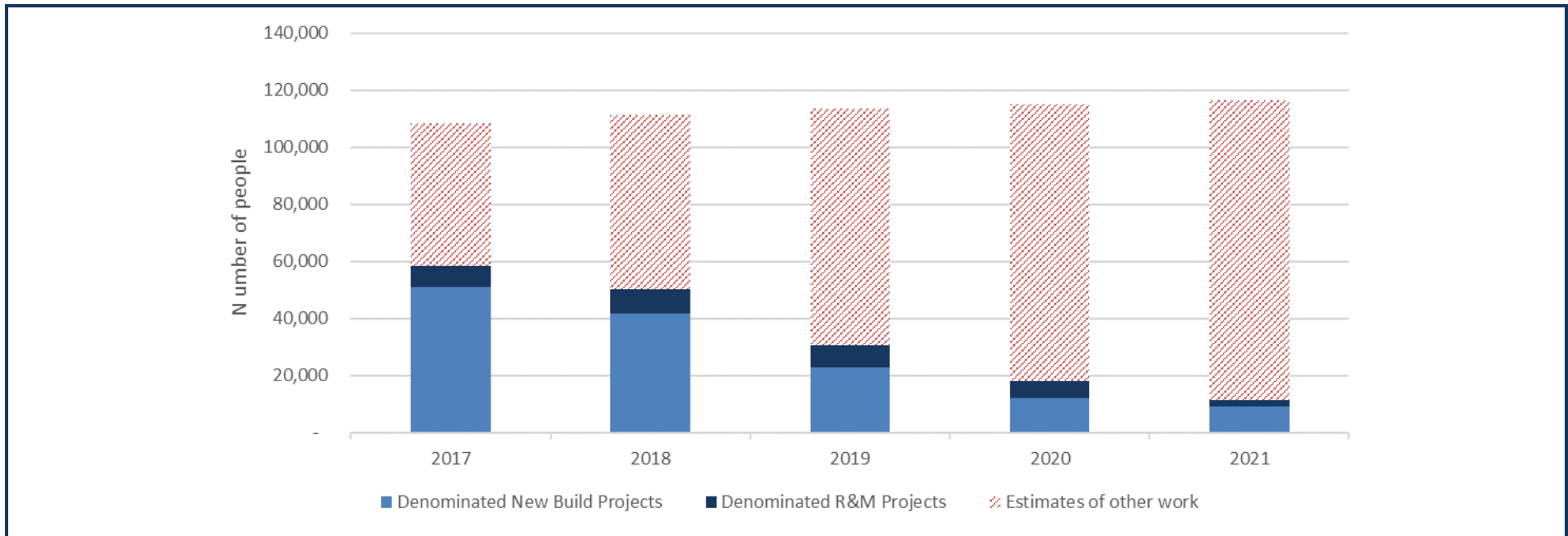


Figure 14: Total construction labour demand including estimates for both R&M and estimates of other work

6.1.1. Glenigan and NICP labour demand

For the peak year in Glenigan of 2017 the detailed breakdown for each of the 28 occupational groups for the Glenigan and the NICP projects is shown in Figure 15. This chart shows the breakdown by occupation for both the denominated pipeline and the estimates of other work.

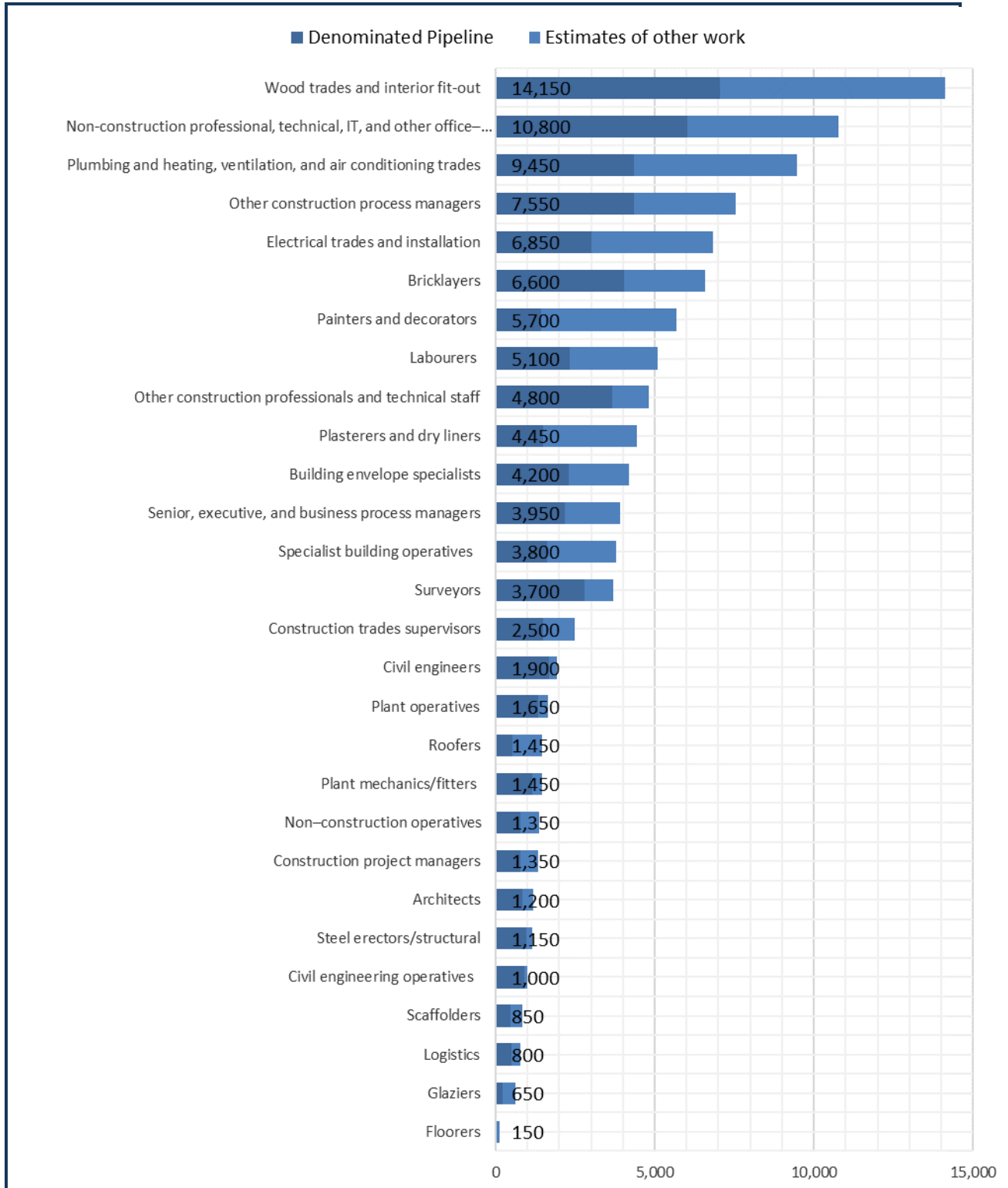


Figure 15: Construction labour demand by occupation in the peak year

6.1.2. Breakdown of labour demand by project type

The labour demand generated by the total denominated projects and the estimates of other work have been calculated for each sector as shown in Table 17.

Table 17: Total construction labour demand by sector

| Project Type | Denominated Pipeline Labour Demand in 2017 (People) | Estimates of Other Work Labour Demand in 2017 (People) | Total Labour Demand in 2017 (People) | % of total in 2017 |
|--------------------|---|--|--------------------------------------|--------------------|
| Non-housing R&M | 200 | 22,250 | 22,450 | 21% |
| Housing R&M | 7,250 | 15,550 | 22,800 | 21% |
| New Housing | 11,550 | 7,850 | 19,400 | 18% |
| Private Commercial | 10,600 | 4,400 | 15,000 | 14% |
| Infrastructure | 11,700 | - | 11,700 | 11% |
| Public Non-housing | 13,200 | - | 13,200 | 12% |
| Private Industrial | 3,950 | - | 3,950 | 4% |
| Total | 58,450 | 50,050 | 108,500 | 100% |

6.2. Summary of demand

- The analysis of the labour demand arising from the construction spend in Wales is about 108,450 people in 2017, taking account of estimates of other work including R&M in addition to the denominated project pipeline of projects.
- During 2017, the peak year of the denominated pipeline demand, the most labour-intensive non-manual occupation group is “non-construction professional, technical, IT and other office-based staff” with an annual demand of 14,150 people.
- The estimate of labour demand for the trade occupations for the peak year of 2017 are as follows:
 - The trade occupation for which demand is highest is “Wood trades and interior fit-out” with 14,150 people;
 - “Plumbing and heating, ventilation, and air conditioning trades” rank third, with a demand of 9,450 people; and
 - “Electrical trades and installation” trades follow with 6,850 people.

7. Construction Excellence Wales Pipeline

Construction Excellence Wales (CEW) publish a pipeline of future construction work in Wales in partnership with the Welsh Local Government Association. This pipeline is categorised against ten sectors covering all Welsh local authorities.

We have compared the items in the CEW pipeline with those in the Glenigan database and those in the WIIP. Because of differences in the way that the data is collected and presented it is not possible to produce a clear mapping between the projects in each data set. To avoid any risk of double counting we have agreed with Constructing Excellence Wales that rather than cross reference all the projects in the pipelines we would produce a separate labour demand estimate of the work included in the CEW pipeline. This labour demand analysis is shown in this section.

7.1. Value of work

This section shows an analysis of the Welsh Construction Excellence Pipeline by total value of work (£m) broken down by both Welsh RSP and project type. The pipeline contains a total value of £3.4bn from 2016/17 to 2019/20. Some of that work is non-construction related with a value of £480m and has been omitted from the analysis. For example, Revenue Account Capital Programme, Fleet Replacement, Vibrant and Viable Places Programme, ICT development and vehicles. The total value of construction work arising from the CEW pipeline during the period is £2,935m.

Figure 16 shows the total value of construction related work arising from the Construction Excellence Pipeline, broken down by Welsh RSP in million pounds (£m). During this period South East Wales has the highest spending value accounting for approximately 45% of the total spend.

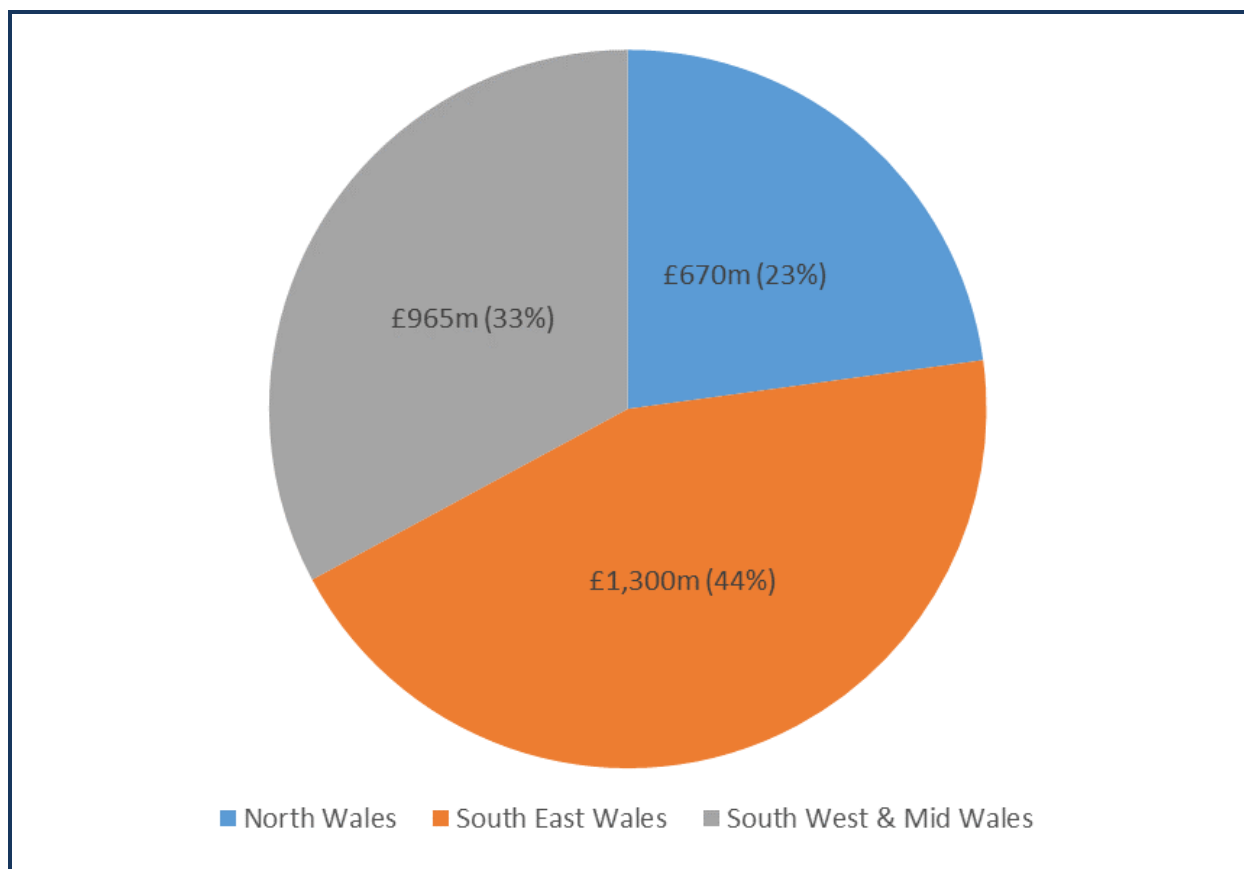


Figure 16: Total value of work, broken down by Welsh RSP (2016/17-2019/20)

Figure 17 shows the total value of work broken down by project type. During the period between 2016/17 and 2019/20 the project type which accounted for the greatest value of work is Public Non-Housing with a spend of around £1,270m. New Housing follows with a spend of just under £880m. Infrastructure rank third, with a total spend of around £570m. These three type of project accounts for 92% of the total value as shown on Figure 18.

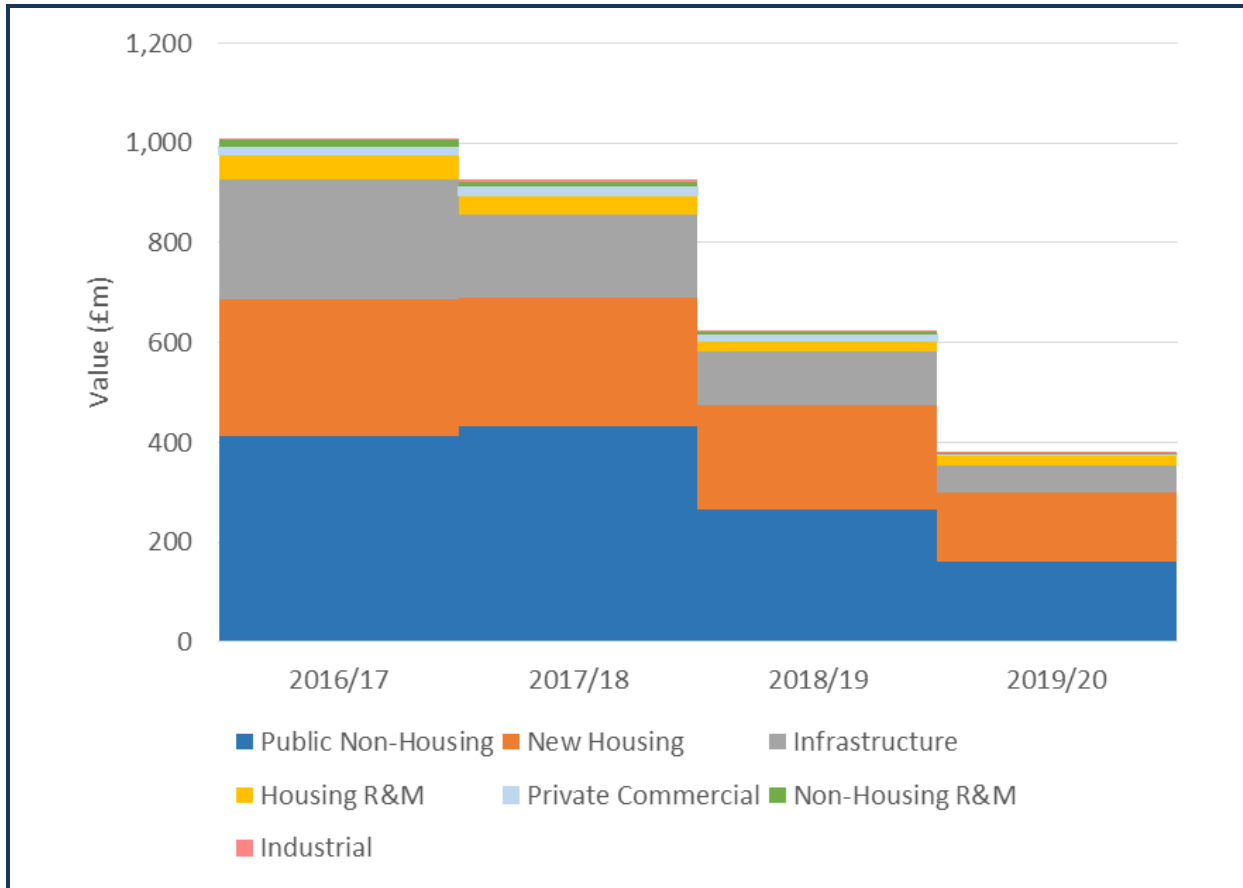


Figure 17: Total value of work by project type and year (2016/17-2019/20)

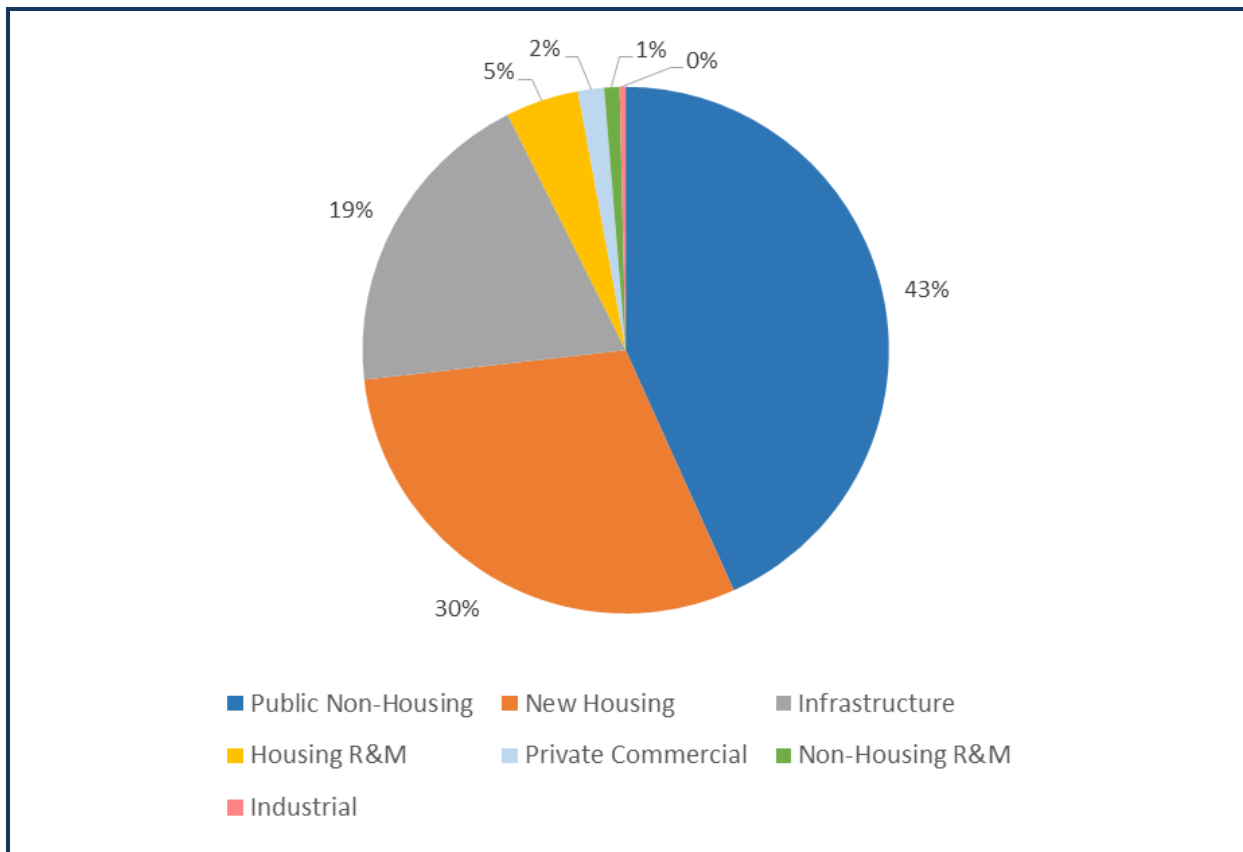


Figure 18: Total value of work by project type (2016/17-2019/20)

7.2. Estimate of total labour demand

This section shows the outcomes of the analysis of the Welsh Construction Excellence Pipeline in terms of the total construction labour demand broken down by both Welsh RSP and project type. Figure 19 shows the total labour demand broken down by the three Welsh RSP's. During this period South East Wales shows the greatest labour demand accounting for approximately 47% of the total labour demand.

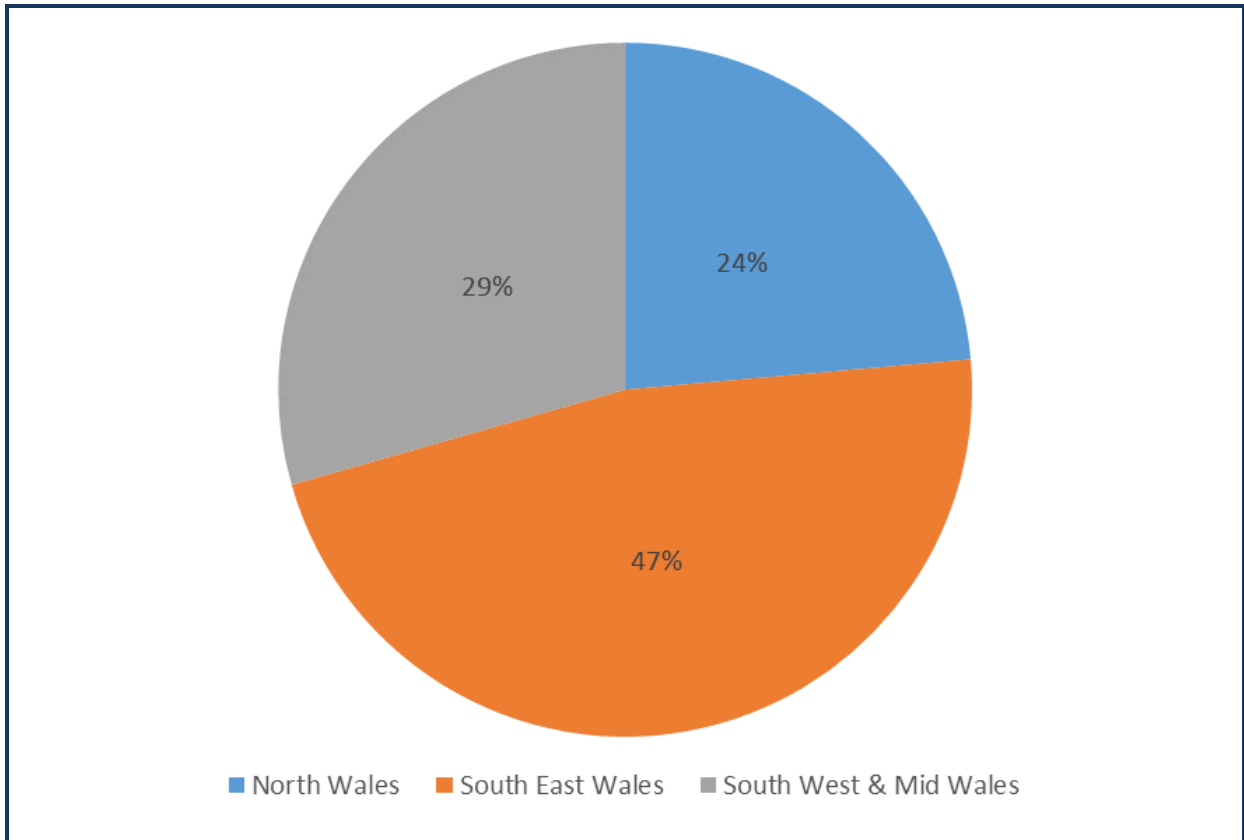


Figure 19: % Labour demand, broken down by Welsh RSP (2016/17 – 2019/20)

Figure 20 and Figure 21 show the total labour demand broken down by project type.

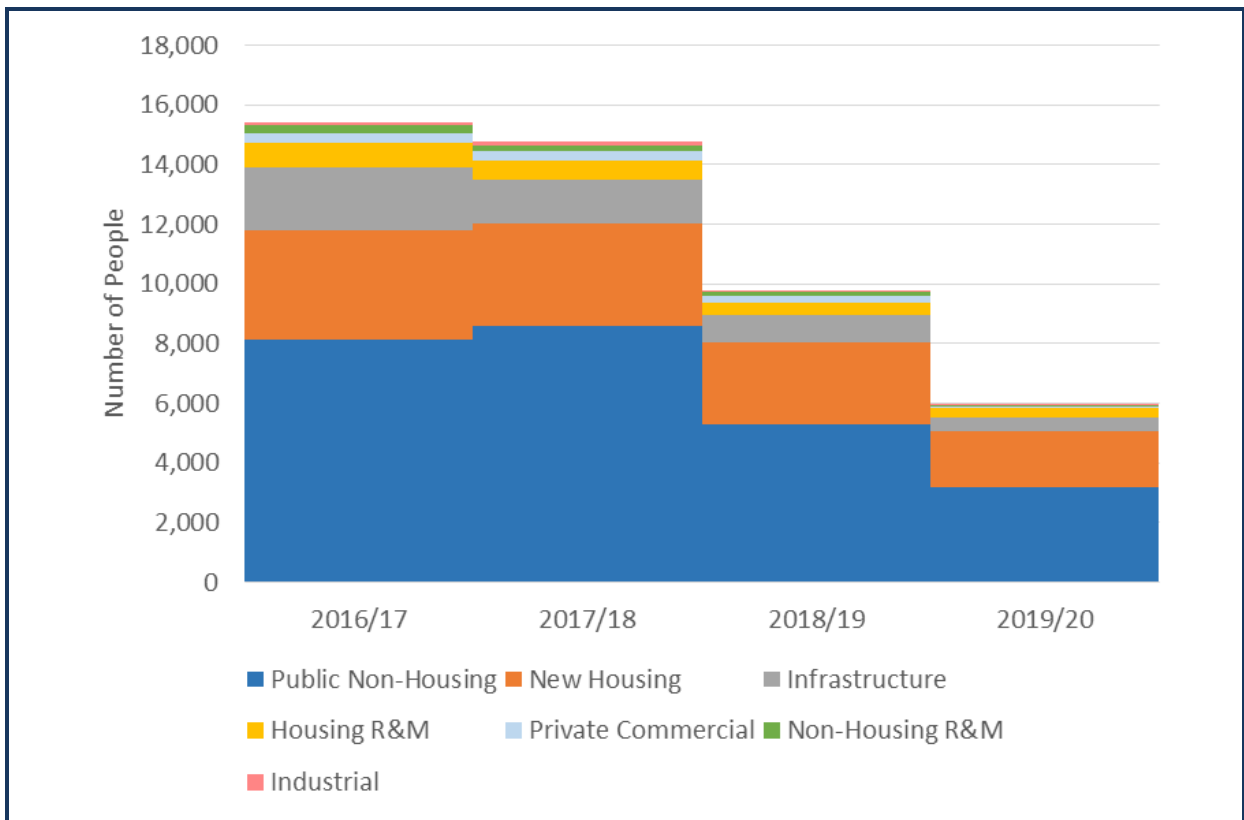


Figure 20: Total labour demand broken down by project type and year (2016/17 – 2019/20)

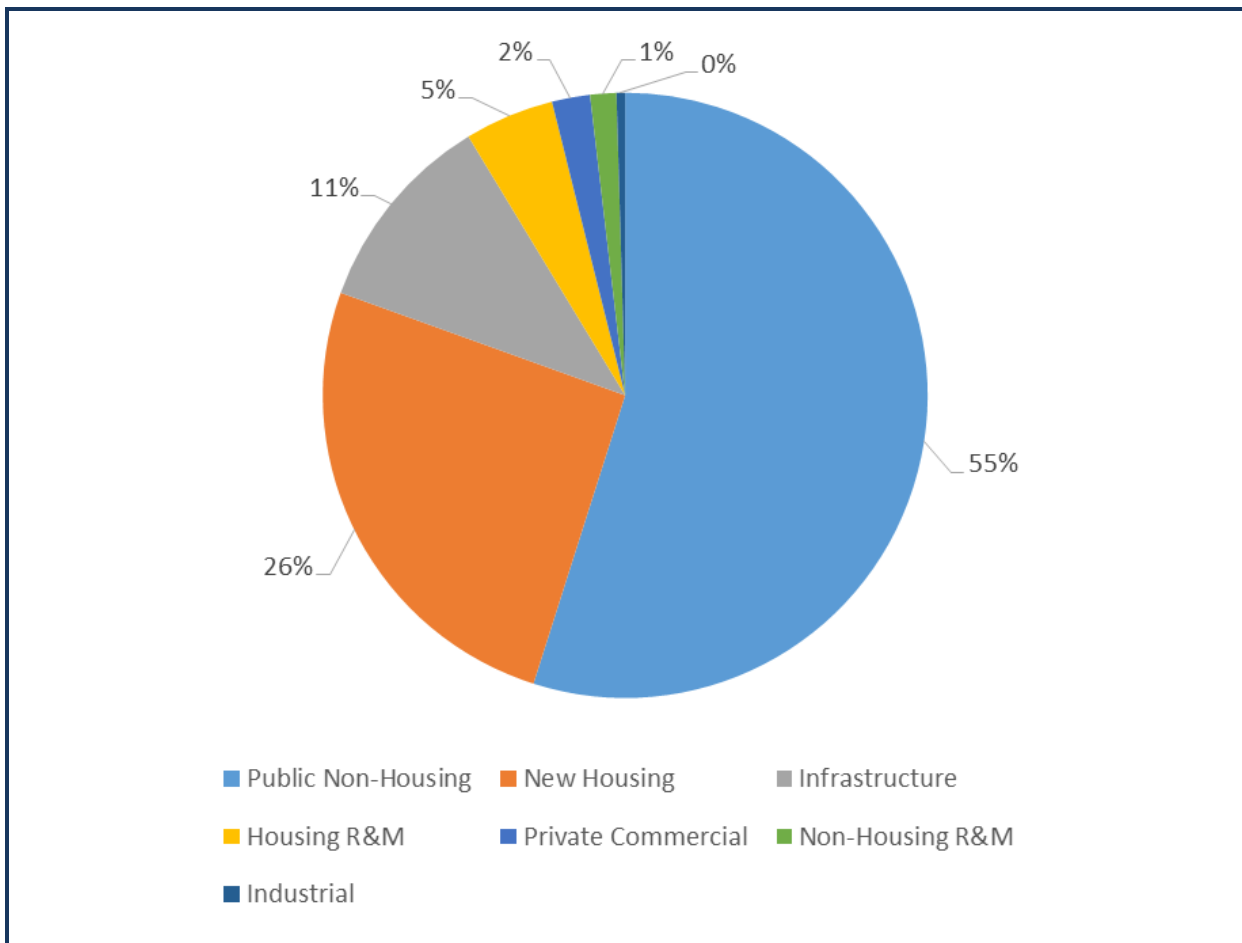


Figure 21: Labour demand broken down by project type (2016/17 – 2019/20)

The analysis shows that during this period,

- the most labour-intensive project type is “Public Non-Housing” accounting for around 55% of the workforce.
- “New Housing” follows with around 26%.

7.3. Demand by occupation

Figure 22 shows the total labour demand in 2017 by 28 occupations. We have compared the labour demand for each occupation with the work in Wales outlined earlier in this report and there are minimal differences.

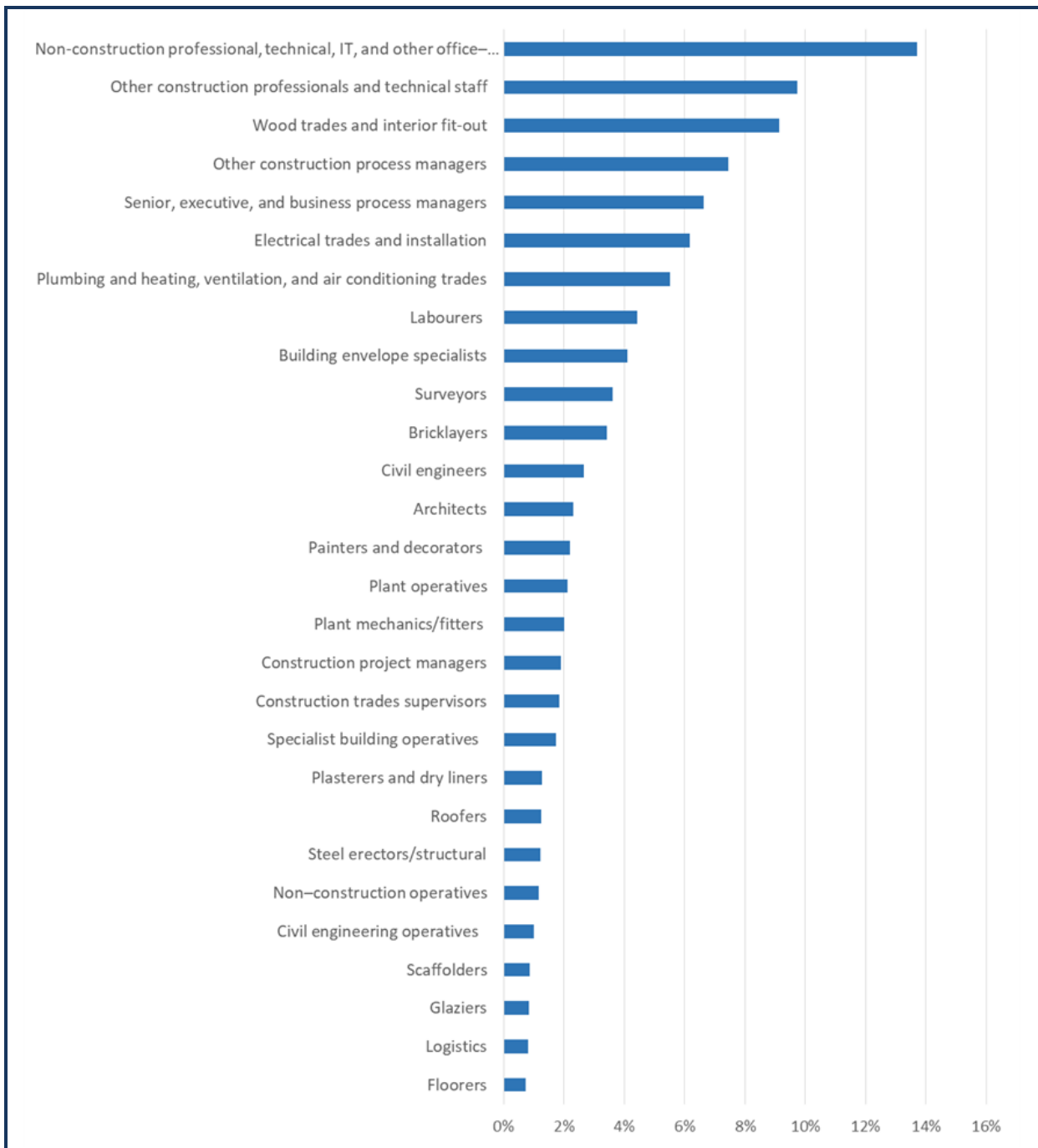


Figure 22: Labour demand in 2017 as a proportion of the total labour demand by each occupation, in the Construction Excellence Wales Pipeline.

8. Construction workforce supply

8.1. Employment trends

The earlier sections of the report looked at the demand for construction labour that will be generated in Wales, sections 10 and 11 will look at the current supply of construction workers and their skills profile.

Wales has borders with the South West, West Midlands and North West English regions. Figure 23 breaks this labour down by nation/region; looking at the trend from 2012 to 2022 (please note the figures from 2017 onwards are projections). In Wales the total construction workforce is 108,470. In Wales and across all of the neighbouring regions growth in the construction workforce is projected.

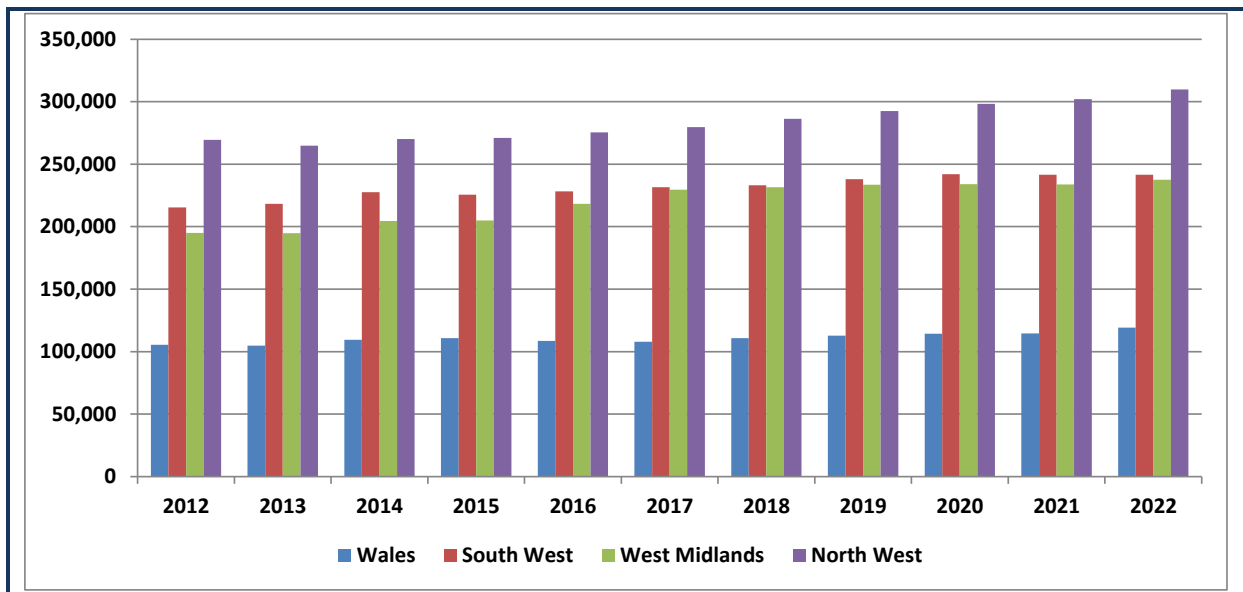


Figure 23: Construction workforce employment, 2012-2022, CITB

Figure 24 explores the trend in construction workforce employment by looking at year on year changes in each nation/region, and highlights the strong performance of all regions from 2012 to 2014 as the economy began to recover from the deep recession.

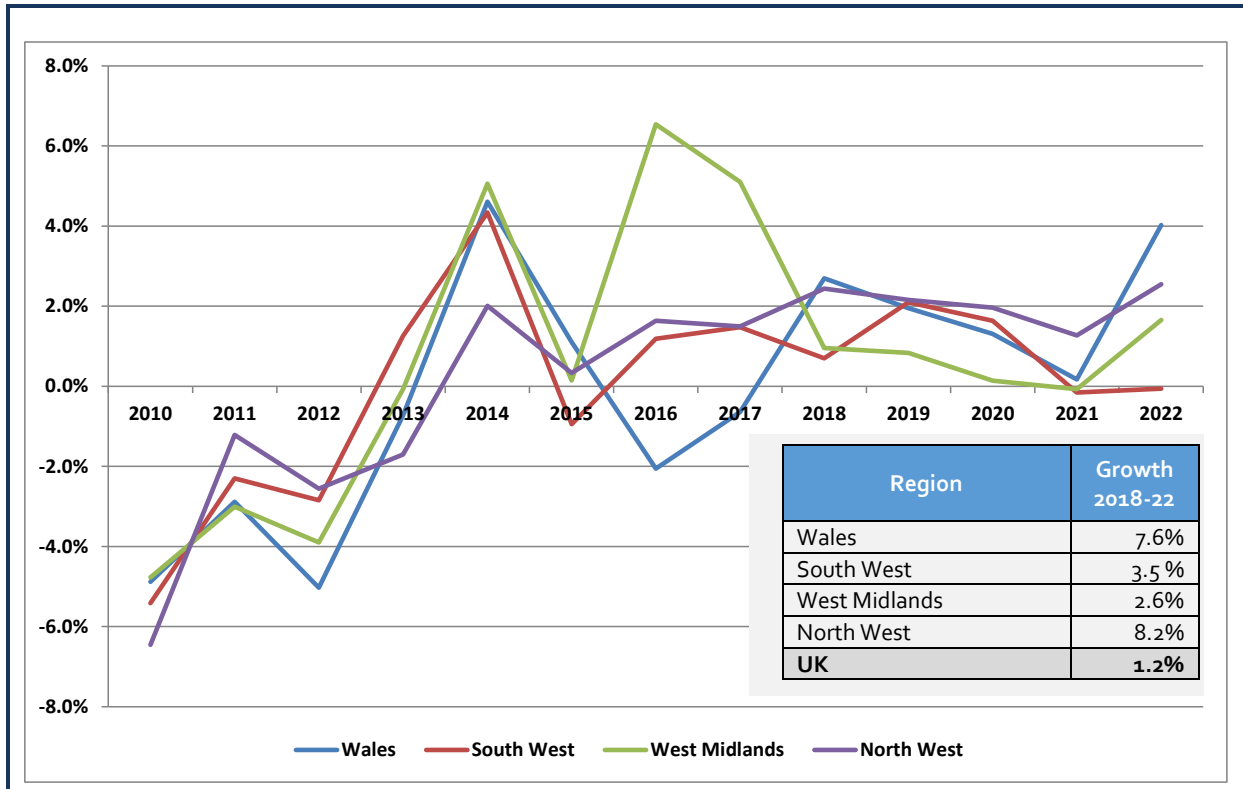


Figure 24: Year on year change in total construction workforce employment, 2010-2021, CITB

Table 18 shows a detailed breakdown of the total construction workforce of 108,470 for 2016 by both occupation and regional area. Almost 63% work in the skilled trades (68,160), just over a quarter (26%) work in managerial/professional occupations (28,310), and the remaining 11% work in office-based roles (12,020). These numbers will form the basis of the gap analysis carried out in section 11.

Table 18: Numbers of construction workers in Welsh regional areas, broken down by occupation, 2016

| | North Wales | SW & Mid Wales | SE Wales | Total Wales |
|---|---------------|----------------|---------------|----------------|
| Manager/Professional Occupations | | | | |
| Other construction process managers | 1,820 | 2,340 | 3,640 | 7,800 |
| Other construction prof and tech. staff | 1,410 | 1,810 | 2,810 | 6,030 |
| Senior, exec, & business managers | 900 | 1,160 | 1,800 | 3,860 |
| Surveyors | 820 | 1,050 | 1,630 | 3,500 |
| Construction Trades Supervisors | 660 | 850 | 1,310 | 2,820 |
| Civil engineers | 440 | 570 | 880 | 1,890 |
| Construction Project Managers | 300 | 380 | 590 | 1,270 |
| Architects | 270 | 340 | 530 | 1,140 |
| Skilled Trades | | | | |
| Wood trades and interior fit-out | 3,130 | 4,040 | 6,260 | 13,430 |
| Plumbing and HVAC Trades | 2,110 | 2,720 | 4,230 | 9,060 |
| Electrical trades and installation | 1,530 | 1,980 | 3,070 | 6,580 |
| Bricklayers | 1,370 | 1,760 | 2,730 | 5,860 |
| Labourers nec* | 1,280 | 1,650 | 2,560 | 5,490 |
| Painters and decorators | 1,190 | 1,540 | 2,380 | 5,110 |
| Plasterers | 1,190 | 1,530 | 2,380 | 5,100 |
| Specialist building operatives nec* | 900 | 1,160 | 1,790 | 3,850 |
| Building envelope specialists | 870 | 1,120 | 1,740 | 3,730 |
| Plant operatives | 430 | 550 | 860 | 1,840 |
| Steel erectors/structural fabrication | 350 | 460 | 710 | 1,520 |
| Roofers | 340 | 440 | 680 | 1,460 |
| Plant mechanics/fitters | 320 | 410 | 640 | 1,370 |
| Civil engineering operatives nec* | 310 | 400 | 620 | 1,330 |
| Logistics | 210 | 270 | 420 | 900 |
| Scaffolders | 190 | 250 | 380 | 820 |
| Glaziers | 140 | 180 | 280 | 600 |
| Floorers | 30 | 30 | 50 | 110 |
| Office-based Staff | | | | |
| Non-construction prof/tech/IT/other | 2,470 | 3,180 | 4,930 | 10,580 |
| Non-construction operatives | 340 | 430 | 670 | 1,440 |
| All Occupations | 25,290 | 32,600 | 50,580 | 108,470 |

Source: CITB

Whilst the majority of the supply of workers in Wales will likely come from the existing construction workforce, increased demand will place a heightened emphasis on the importance of the inflow of new entrants into the industry. New entrants will come from three main sources: those leaving education, those moving into the construction industry from other sectors, and also migrant construction workers moving to the UK (each of which will now be considered in turn). Indeed, the potential impact of Brexit negotiations on the last of these inputs could precipitate a need for a renewed and heightened focus on attracting those leaving education and from other sectors if the numbers of migrant workers entering the country does reduce.

8.2. Construction workforce profile

8.2.1. Demographics

The age demographic profile for the Welsh construction sector compared to the all industry profile is shown in Figure 25:

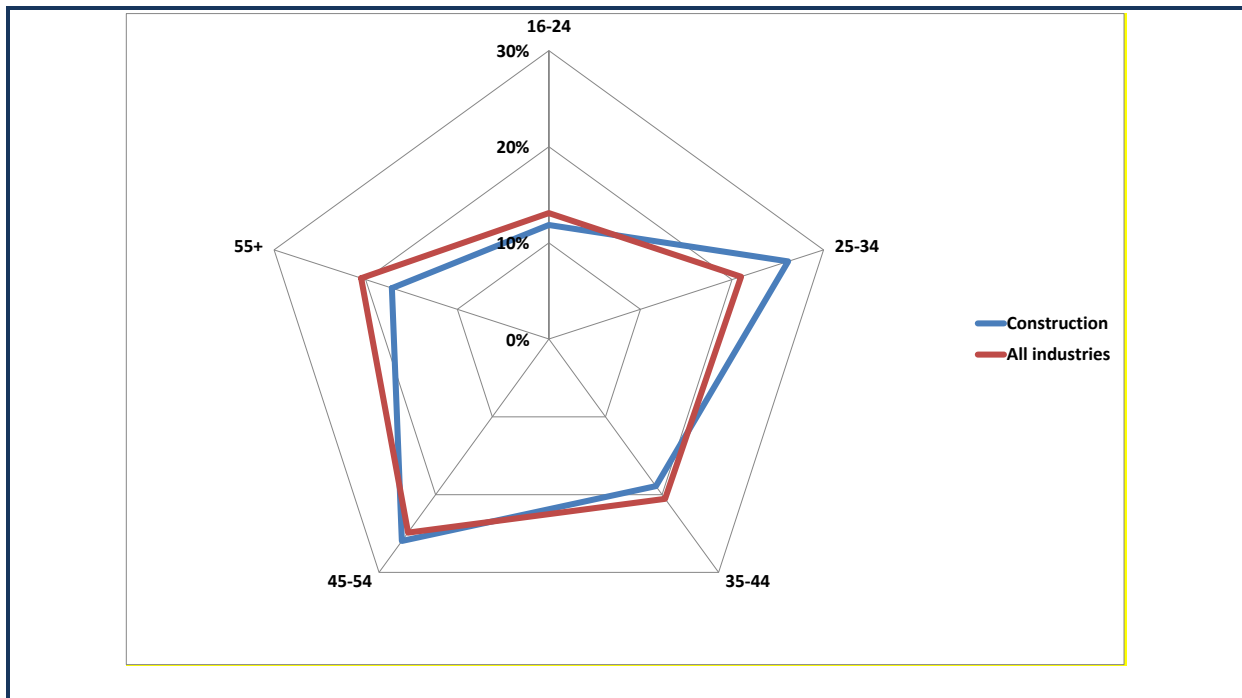


Figure 25: Age profile of construction and all industries, ONS Labour Force Survey, 2016

As construction accounts for around 7% of the Welsh workforce, the construction workforce profile largely mirrors the age profile of all industries in Wales - there is an ageing workforce (17% of the Welsh construction workforce is aged 55+, similar to all industries 20%).

As the timeframe for this forecast runs until 2021, consideration needs to be given to an ageing construction workforce, many of whom will be approaching retirement age during this period. This will result in a strong replacement demand for workers if the required sector employment levels are to be met.

8.2.2. Attracting young people

The current proportion of younger aged workers (16-24) highlights the issue in recruiting new young people into the construction workforce to replace those retiring. The reduced levels of young people coupled with a bulk of workers with the potential to retire presents potential issues for the sector.

Investigating the reasons as to why recruitment of young people into the industry has been such a challenge is useful in order to highlight the areas where any action should be directed in order to enhance and improve the appeal of construction as a career option. The Construction Information, Advice and Guidance (CIAG) research⁴ carried out by CITB on an annual basis investigates young people's opinions of the construction industry as a potential career choice and highlights the extent of the problem. Although improving, the average score for the attractiveness of the construction industry amongst young people is just 4.2 out of 10.

⁴ Careers Information Advice and Guidance Research Report 2016 (CITB)

The reasons for scoring the attractiveness so low are varied, but the most commonly cited are around the perception of a career in construction as being:

- A low paid industry
- Not offering good career progression
- Long working hours
- Mundane/unglamorous
- Risky/dangerous
- Lack of different routes into the industry
- A feeling the industry is for unprofessional and low qualified individuals – a ‘fall back’ career
- A fear they will not be surrounded by like-minded people (related to the preceding point).

The attractiveness of the industry amongst females is even lower, rating the attractiveness on average at 3.2 out of 10, as well as amongst some ethnic groups such as Black/African/Caribbean and Black British ethnic groups who also score it on average 3.2. Such low appeal amongst these groups significantly reduces the talent pool from which the construction industry is recruiting from, and is reflected in the fact they are significantly underrepresented within the industry.

Any action taken to tackle this problem needs to address the points above and counteract these negative perceptions of the industry. A key action should be communication that focuses on the professional nature of careers in the industry, the huge variety of both academic and practical roles (‘something for everyone’), opportunities for career progression, as well as financial reward. There is also a need to address the concerns around safety in the industry in order to overcome perceptions of risk and danger.

Research also showed a positive association and link between knowledge and attractiveness, and that where knowledge of the industry was high amongst young people, and/or where they had exposure to the industry via friends and family, they had a more positive perception of the industry. Any opportunities to increase this knowledge base at a young age and also their exposure to the industry should also strongly be considered as a means of challenging negative and inaccurate stereotypes of the industry. A key aspect of this is engaging with careers advisors in schools to ensure they have both the knowledge and motivation/willingness to be able to talk to and encourage young people to consider construction as a career choice.

8.2.3. Attracting workers from other industries

There are other industries which contain workers with technical and practical skills that are transferrable into the construction industry, and as such, should also be considered to fill the void left by those retiring. The armed forces is a good example; many ex-military personnel are skilled in many of the right areas required to succeed in construction and often only need minimal training in order to begin making a contribution.

In addition, many roles in the construction industry are not necessarily construction-specific, and where this is the case, workers can easily shift to work in the construction sector. The most notable examples here include logistics, project managers, plant operatives, plant mechanics/fitters, non-construction operatives and non-construction professional, technical, IT, and other office-based staff.

8.3. Mobility

Looking at the levels of workforce mobility in the construction sector provides an indication of the extent to which the workforce is adaptable, flexible and willing to travel. Research⁵ into mobility carried out in 2015 showed that the average travel to work distance for a Welsh construction worker was 16 miles which compares closely to the UK average 22 miles. This perhaps highlights the extent to which construction workers have been more easily able to find work within a closer proximity to their current residence as we move out of a deep recession and work picks up again.

Indeed, whilst 78% of workers in Wales typically travel under 20 miles to work, just 4% travel 50 or more miles. However, when the furthest distance worked from permanent or current home is considered, a different picture is painted. Approaching a fifth of all construction workers have worked no more than 20 miles away (18%), four in ten have worked between 21 and 50 miles away (40%), just over a quarter (27%) between 50 and 100 miles away and the remaining 15% have worked more than 100 miles away. This is important, as it shows that although the average distance to work is quite short, there is nevertheless a strong willingness to travel when required to do so.

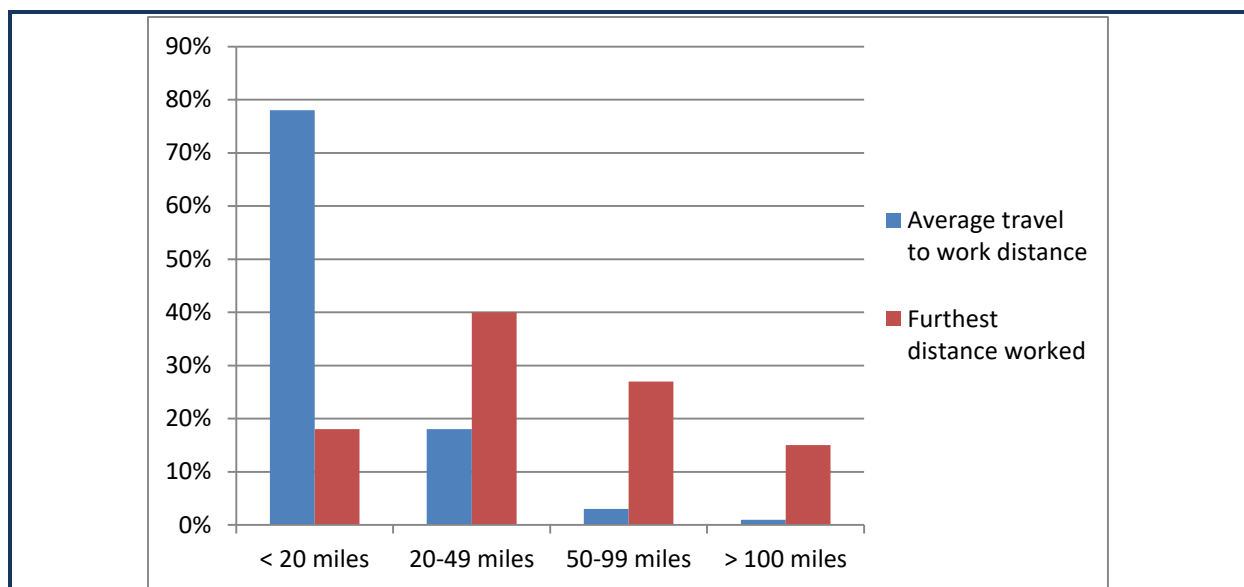


Figure 26: Distance from workers' current residence (including temporary residences) to their current site of work compared with furthest distance worked from permanent/current home, CITB 2015

Looking at mobility over the longer term, three quarters of construction workers (94%) in Wales live in the same region in which they started their construction career. However, this varies widely from region to region, most notably in Greater London (50%) and the South East (55%) which experiences much higher levels of workers coming in from other areas.

When looking at qualifications a similar theme emerges. 83% of workers based in Wales achieved their first construction qualification there, higher than 55% for South East, rising to 65% for East Midlands, 79% for West Midlands, 82% for Yorkshire & Humber and 90% for the North West. All in all this shows a far more mobile workforce in the South, with the need for mobility reducing in Wales and the North.

The stability of the workforce is displayed by the fact that 63% of workers in Wales (UK average 70%) have only ever worked in the construction industry. More than half of construction workers in Wales have worked pretty much continuously, without spells out of work (53% compared to 55% across the UK).

⁵ Workforce Mobility and Skills in the UK Construction Sector 2015 (CITB)

The findings from the mobility research highlight the extent to which the construction sector overall has a flexible and consistent workforce that is both willing to travel if required and able to adapt to different types of work being carried out. However, the extent to which this is true does vary across the UK.

8.4. International migration

Figure 27 shows the geographical distribution of migrant workers in construction by region/nation. In 2015, the percentage of workers born outside the UK was highest in London, followed by South East England. The proportions of migrant workers were lowest in North East England, Northern Ireland and Wales.

In Wales 4.8% (4,850) of the construction workforce is overseas born (3% overseas born non-UK citizen and 1.8% overseas born UK citizen).

Recent CITB research⁶ found that employers don't have an explicit strategy of recruiting migrants but rather, select from the best applicants, and their common reasons for taking on non-UK workers included availability and skills shortages. Employers and recruiters also said that migrant workers add flexibility, speed of response to skills needs, have a strong work ethic and are often happy to pick up extra work.

The research notes that there will undoubtedly be changes ahead as government outlines its future plans for migration policy and employers decide how best to resource their labour and skills needs as Brexit gets underway. However, most non-UK workers confirmed that they are not planning to leave the UK. Over three quarters of migrant construction workers expect to stay in the next 12 months, and over half (56%) and particularly older workers say they wish to remain in the UK until retirement.

If access to non-UK workers is further restricted then employers in Wales may need to recruit labour from alternative sources and there may be increased demand for training.

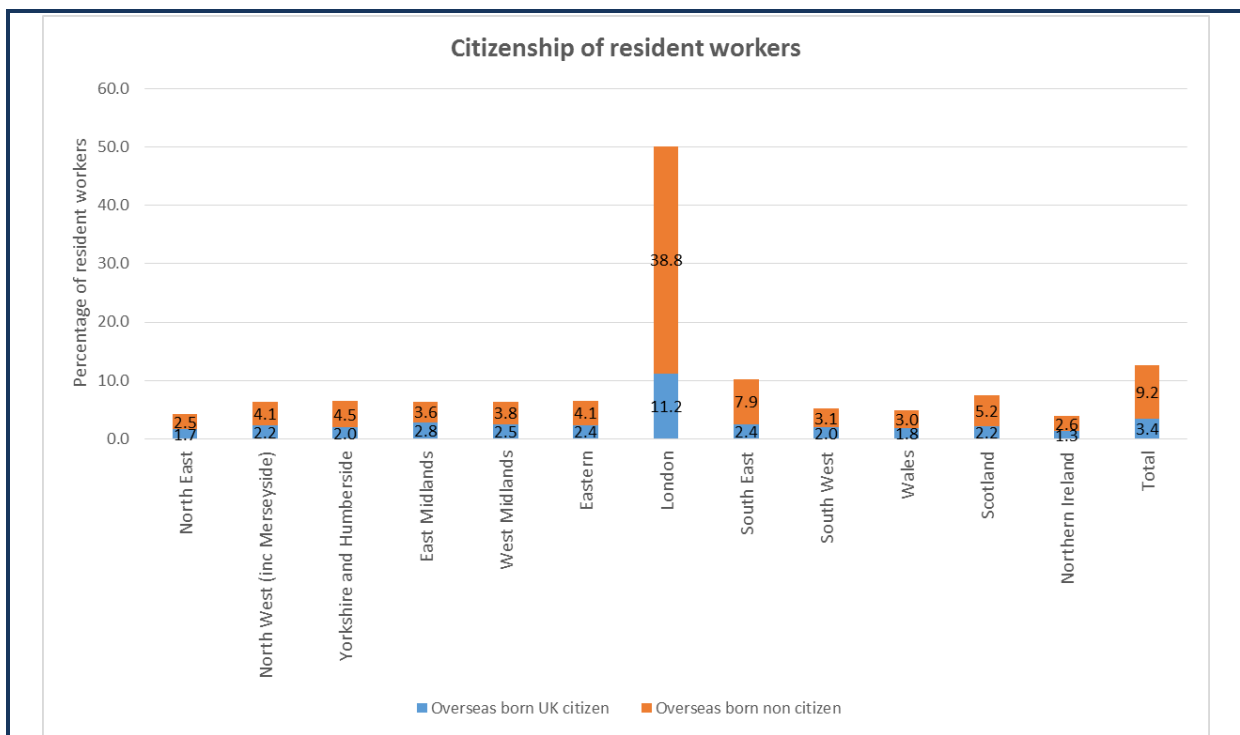


Figure 27: Geographical distribution of migrant workers in construction, Labour Force Survey 2015

⁶ Migration research 2017 (CITB)

8.5. Summary of construction workforce supply

- In Wales the total construction workforce is 108,470. In Wales and across all of the neighbouring regions growth in the construction workforce is projected to 2022.
- As construction accounts for around 7% of the Welsh workforce, the construction workforce profile largely mirrors the age profile of all industries in Wales - there is an ageing workforce (17% of the Welsh construction workforce is aged 55+, similar to all industries 20%).
- Research⁷ into mobility carried out in 2015 showed that the average travel to work distance for a Welsh construction worker was 16 miles which compares closely to the UK average 22 miles.
- In Wales 4.8% (4,850) of the construction workforce is overseas born (3% overseas born non-UK citizen and 1.8% overseas born UK citizen).

⁷ Workforce Mobility and Skills in the UK Construction Sector 2015 (CITB)

9. Construction workforce training

9.1. Overview

Within the construction sector an extremely wide range of training is carried out, but recognised qualification achievement is made up of two main strands:

1. **Further education** – typically taking the form of national vocational qualifications (NVQs) and including apprenticeships (looked at later as a subgroup of further education)
2. **Higher education** – made up predominantly of degree and postgraduate qualifications, but also includes foundation degrees, HNCs and HNDs.

Figure 28 shows the recent trends for further education (FE) achievements in Wales with FE split by learning aim into competence and knowledge based qualifications. This distinction is important as it is the competence based qualifications (NVQ's) that are closely recognised by the construction sector as being benchmarks for competence as they assess practical application of learning within the workplace, together with underpinning theory and knowledge and it is these qualifications that are usually closely linked to industry card schemes such as the Construction Skills Certification Scheme (CSCS) and Construction Plant Competence Scheme (CPCS).

Knowledge based qualifications are those that impart the underpinning theory or knowledge and are typically taken by learners entering full-time further education. Colleges will provide some practical competence based experience including work experience and students may have the opportunity to achieve CSCS or CPCS cards to enter the industry through that route.

In 2016 the Ofqual dataset indicates 9,750 FE qualification achievements, split one third (34%) competence based and the remaining two thirds (66%) knowledge based. This split has been similar for the last 3 years, although the dataset indicates a more even split in 2012.

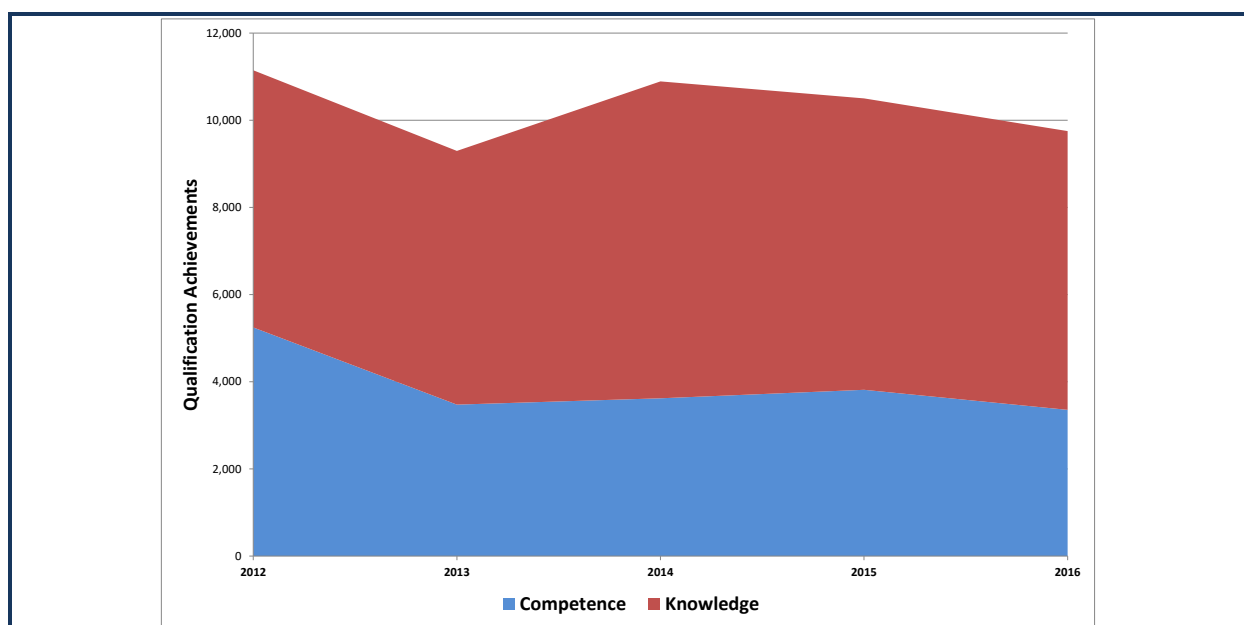


Figure 28: Training overview – FE achievements split by competence/knowledge learning aim 2012-2016, Ofqual

In higher education, just over half of construction achievements are a first degree (53%), with a further 17% at postgraduate level and 30% made up of other undergraduate qualifications.

Quantifying the reduction in graduates qualifying from Welsh based universities; we can see that over the period 2010-2015 first degrees have reduced by 160, postgraduate by 90 and other undergraduate by 70.

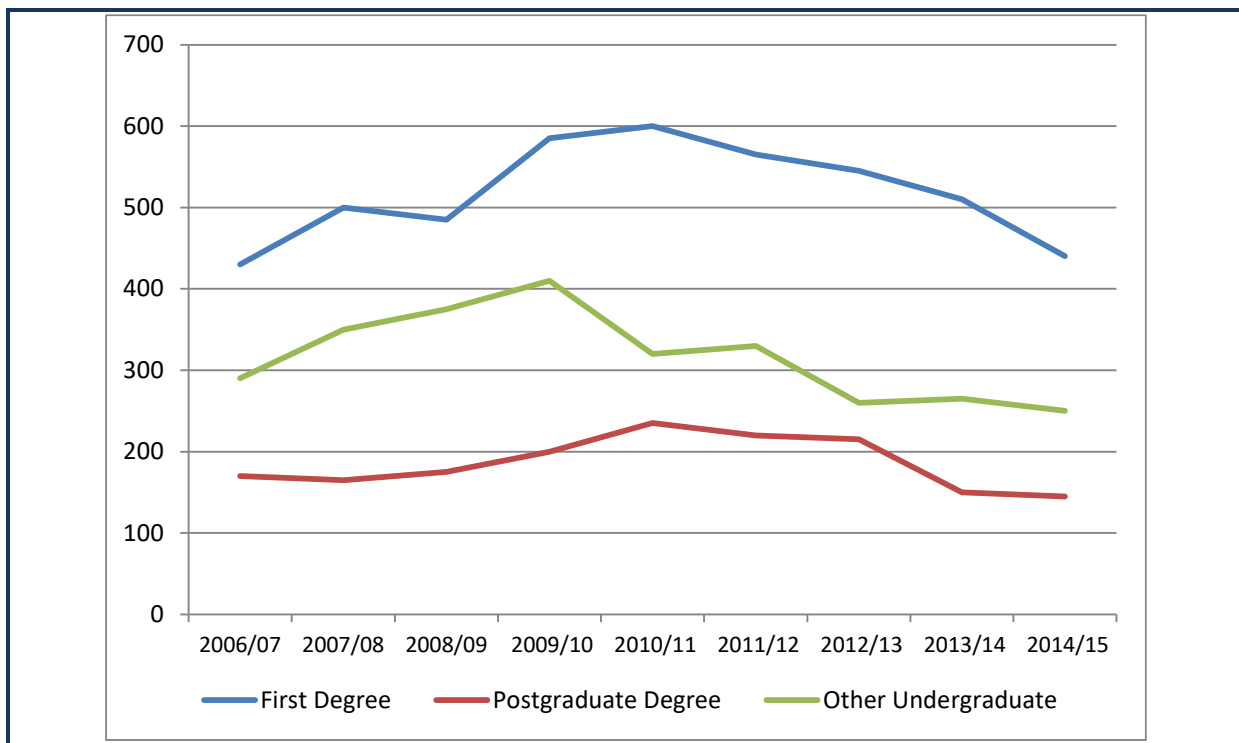


Figure 29: Training overview, higher education – first degree, postgraduate degree and other undergraduate achievements 2006/07 – 2014/15, HESA

The increases and decreases in training achievements are to a large extent determined by the economy and the extent of work available in the sector at any given time, particularly in further education. The upturn in the economy in recent years has coincided with a pattern of increased workload across the sector as we emerge from the recession. The knock on effect of this is not only an increase in the numbers working in the industry, but also an increase in the amount of training being carried out.

The degree to which this has held true for higher education achievements is evidently less, with numbers continuing to decrease in the face of an upturn in the construction sector. The reasons for this are varied, but rising tuition fees have certainly been a powerful factor. In addition, because degrees generally take longer to complete (three to four years full time) and further education achievements are usually obtained whilst working, further education is more susceptible to economic changes in the working environment whereas there is a much more delayed knock on effect in terms of higher education achievements due to the length of the courses.

Details for both further and higher education participation point to an established network of training providers for the construction sector, and the following sections looks at this in more detail. These are split by construction operative training (further education), apprenticeships, and design technical and construction management training (higher education).

9.2. Further education training

This section initially focuses in on competence achievements. Figure 30 shows the recent trends for further education (FE) competence achievements. A significant proportion of the 3,325 achievements in 2016 are at level 2 (85%), which is generally accepted as a benchmark for competence by the sector and used for skills cards, such as the Construction Skills Certification Scheme (CSCS). A further 14% of

achievements are level 3, leaving less than 1% at level 4 or above. For some occupations, notably electricians, different benchmarks are set that must be met to be considered competent, and means a higher volume of training for these occupations is undertaken at level 3. The split in proportion of qualification achievements by level has stayed similar in Wales over the period to 2102-2016.

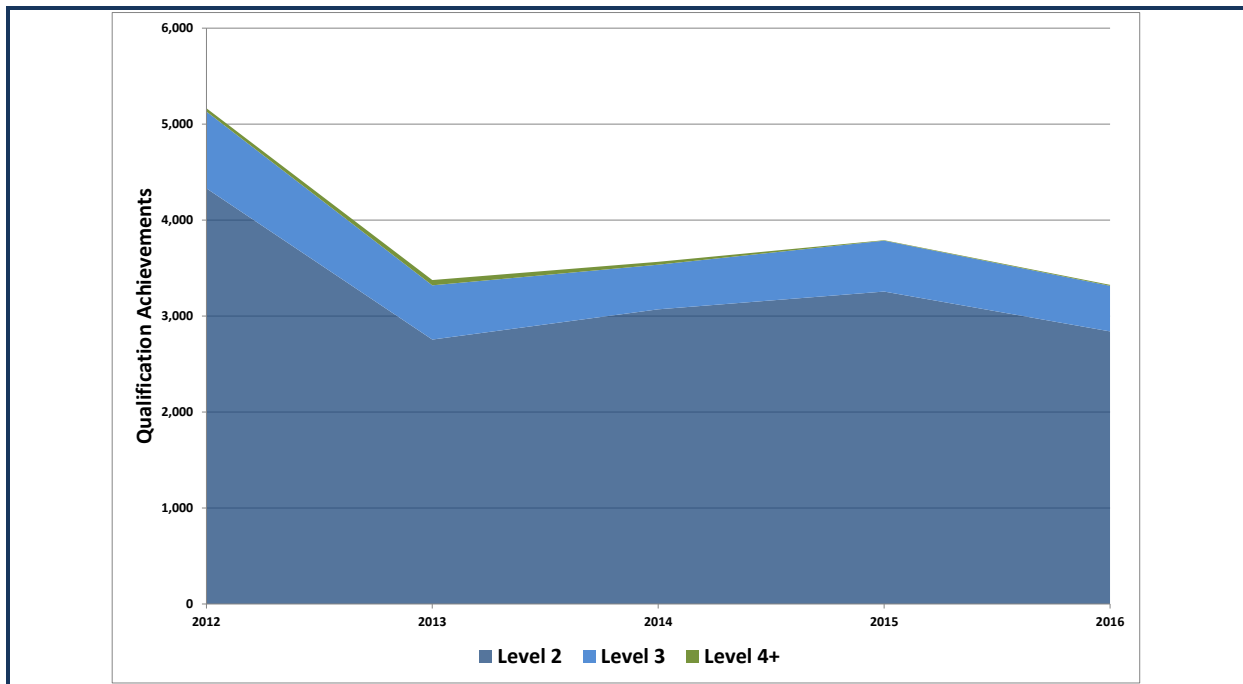


Figure 30: Training overview – national vocational qualification (NVQ) achievement and other further education competence achievements 2012-2016, Ofqual

As highlighted in Figure 30 previously, construction operative competence training is focused predominantly towards qualifications at level 2 and level 3. These qualifications are delivered by a range of organisations such as further education colleges, private training providers, employers, training groups or training bodies. Figure 31 shows the geographical location of training providers.

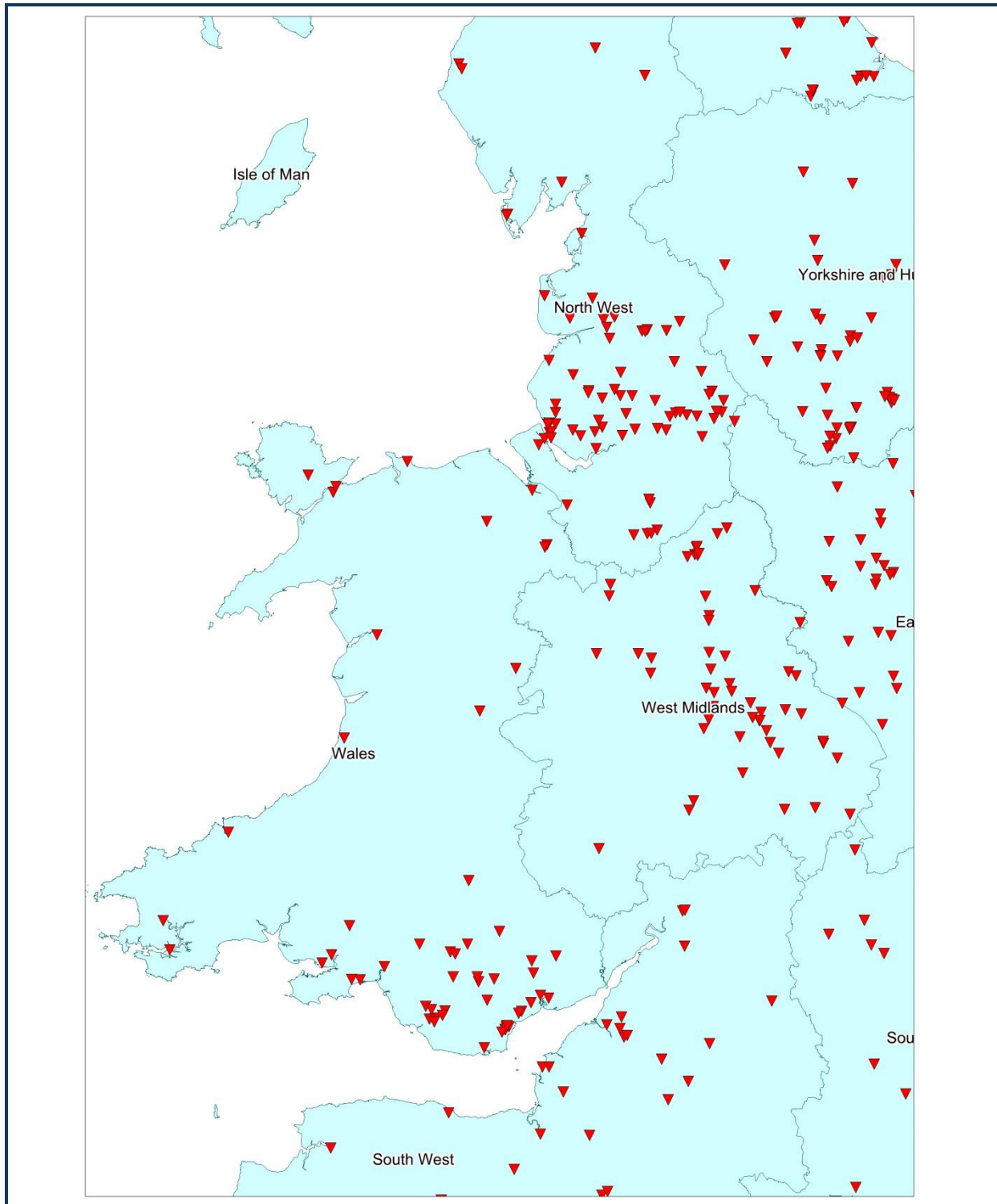


Figure 31: Training provider location, England and Wales, 2017, CITB

These construction training providers deliver a broad range of training to those employed in the construction sector across over 150 different job descriptions. A range of qualifications have been developed to offer relevant training that is specific to the needs of varying occupations, and we are able to view further education achievements by occupation in order to understand the spread of achievements across the sector. Figure 32 and Table 19 shows further education competence qualification achievements in Wales for 2016 broken down by occupation as well as level.

Training related to the operation of construction plant machinery still accounts for a significant overall share (19%) of further education construction training, mirroring the historic trend. Training to NVQ level 2 is a competence requirement for any operative looking to work on a construction site, with the Construction Plant Competence Scheme (CPCS) being the accepted norm for workers operating any machinery on site. As there are different qualifications for different categories of machinery, this can mean an operative having to obtain multiple NVQs to operate a range of machinery. It is also possible for plant machinery to be used in other sectors (e.g. agriculture, quarrying, and mining). These factors (work requirement, multiple categories, and other sectors) have resulted in high demand for plant qualifications and hence the high volume occurring here.

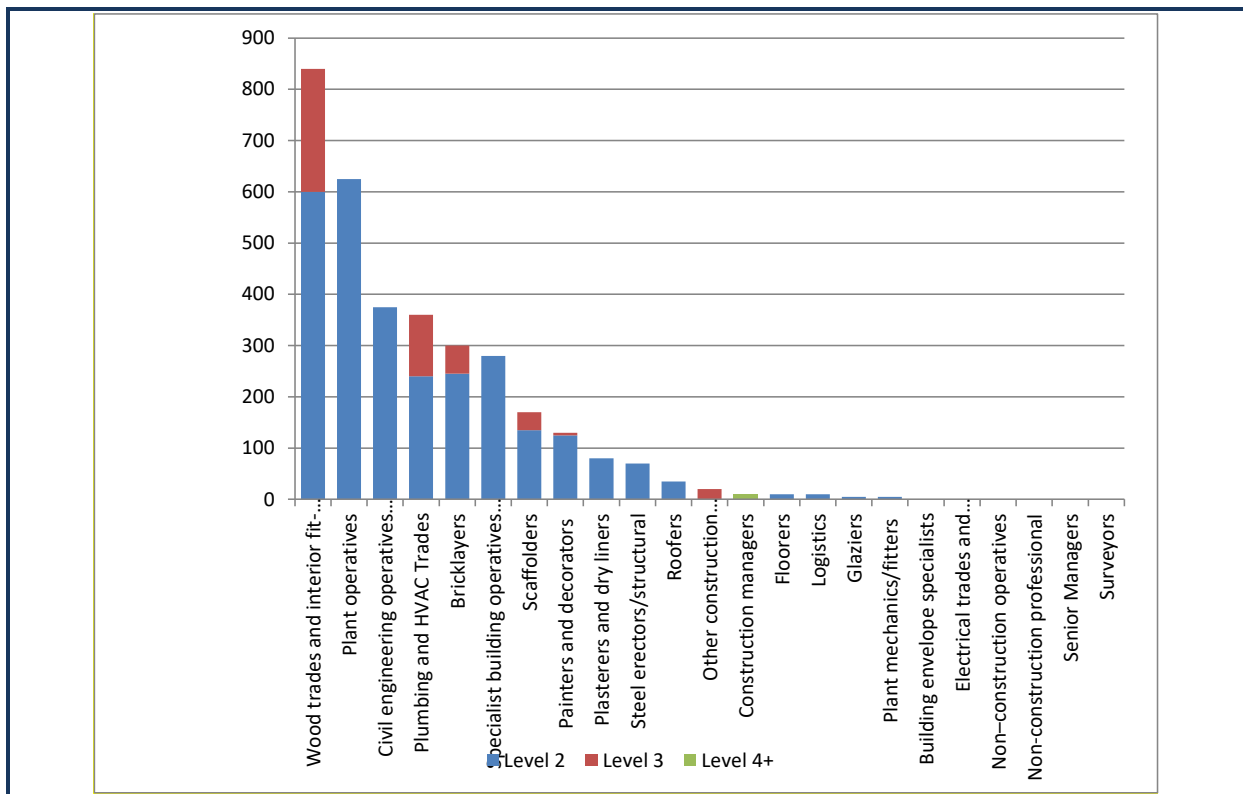


Figure 32: Occupational breakdown of construction further education competence qualifications, Wales 2016, Ofqual

Table 19: Occupational breakdown of construction further education competence qualifications, Wales 2016

| Occupation | Qualification Level | | | | | | Total | |
|--|---------------------|-------------|------------|-------------|-----------|-------------|--------------|-------------|
| | Level 2 | | Level 3 | | Level 4+ | | | |
| | Vol | % | Vol | % | Vol | % | Vol | % |
| Wood trades and interior fit-out | 600 | 21% | 240 | 51% | 0 | 0% | 840 | 25% |
| Plant operatives | 625 | 22% | 0 | 0% | 0 | 0% | 625 | 19% |
| Civil engineering operatives nec* | 375 | 13% | 0 | 0% | 0 | 0% | 375 | 11% |
| Plumbing and HVAC Trades | 240 | 8% | 120 | 25% | 0 | 0% | 360 | 11% |
| Bricklayers | 245 | 9% | 55 | 12% | 0 | 0% | 300 | 9% |
| Specialist building operatives nec* | 280 | 10% | 0 | 0% | 0 | 0% | 280 | 8% |
| Scaffolders | 135 | 5% | 35 | 7% | 0 | 0% | 170 | 5% |
| Painters and decorators | 125 | 4% | 5 | 1% | 0 | 0% | 130 | 4% |
| Plasterers and dry liners | 80 | 3% | 0 | 0% | 0 | 0% | 80 | 2% |
| Steel erectors/structural | 70 | 2% | 0 | 0% | 0 | 0% | 70 | 2% |
| Roofers | 35 | 1% | 0 | 0% | 0 | 0% | 35 | 1% |
| Other construction professionals and technical staff | 0 | 0% | 20 | 4% | 0 | 0% | 20 | 1% |
| Construction managers | 0 | 0% | 0 | 0% | 10 | 100% | 10 | 0% |
| Floorers | 10 | 0% | 0 | 0% | 0 | 0% | 10 | 0% |
| Logistics | 10 | 0% | 0 | 0% | 0 | 0% | 10 | 0% |
| Glaziers | 5 | 0% | 0 | 0% | 0 | 0% | 5 | 0% |
| Plant mechanics/fitters | 5 | 0% | 0 | 0% | 0 | 0% | 5 | 0% |
| Building envelope specialists | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| Grand Total | 2,840 | 100% | 475 | 100% | 10 | 100% | 3,325 | 100% |

Source: Ofqual (2016)

Please note this table includes the removal of instances where the qualification cannot be aligned to an occupation.

Apart from plant qualifications, achievements in other qualification areas tend to follow the pattern of general employment in the workforce, with occupations such as wood trades, civil engineering operatives and bricklayers having significant shares.

9.3. Regional picture of further education training

Whilst the Ofqual data on further education training currently delivered in the construction sector provides a good picture of overall achievements by occupation at a national level, it unfortunately does not allow for analysis at regional level. However, data on construction training at an occupational level by region is available from the Welsh Government. It should be noted that although this data will

only cover training that is supported by public funding from Welsh Government for construction, it will still cover the majority of further education achievements.

Analysis of data on further education construction achievements (note this analysis includes both competence and knowledge based learning aims) for the regional areas in Wales shows that there were nearly 11,100 achievements. Table 20 breaks this down by occupation and regional area, and shows that South East Wales accounts for half of training (51%), with the remainder split between North (25%) and SW & Mid Wales (24%).

For occupations where there are at least 500 achievements the split of regional area training follows this broad pattern. There are some exceptions for example training related to Electrical trades and installation tends to be concentrated in SW & Mid Wales, Civil engineering operative and Scaffolding tends to be concentrated in South East Wales.

Table 20: Occupational and regional breakdown of construction further education qualifications – publicly funded only, Wales 2015/16

| | North Wales | %North Wales | SW & Mid Wales | %SW & Mid Wales | SE Wales | %SE Wales | Total for Wales | %Total for Wales |
|--|--------------|--------------|----------------|-----------------|--------------|------------|-----------------|------------------|
| Wood trades and interior fit-out | 610 | 20% | 590 | 20% | 1,810 | 60% | 3,010 | 27% |
| Plumbing and HVAC Trades | 610 | 23% | 730 | 28% | 1,280 | 49% | 2,610 | 24% |
| Bricklayers | 310 | 19% | 430 | 26% | 890 | 55% | 1,630 | 15% |
| Electrical trades and installation | 380 | 27% | 600 | 43% | 420 | 30% | 1,390 | 13% |
| Plasterers and dry liners | 290 | 29% | 190 | 19% | 530 | 53% | 1,000 | 9% |
| Painters and decorators | 80 | 16% | 80 | 16% | 340 | 68% | 500 | 5% |
| Plant operatives | 240 | 83% | 0 | 0% | 50 | 17% | 290 | 3% |
| Civil engineering operatives nec* | 30 | 20% | 0 | 0% | 110 | 73% | 150 | 1% |
| Specialist building operatives nec* | 60 | 55% | 10 | 9% | 40 | 36% | 110 | 1% |
| Scaffolders | 0 | 0% | 0 | 0% | 90 | 100% | 90 | 1% |
| Other construction professionals | 20 | 25% | 20 | 25% | 50 | 63% | 80 | 1% |
| Floorers | 10 | 17% | 0 | 0% | 40 | 67% | 60 | 1% |
| Roofers | 50 | 100% | 0 | 0% | 10 | 20% | 50 | 0% |
| Construction Trades Supervisors | 20 | 50% | 10 | 25% | 10 | 25% | 40 | 0% |
| Construction managers | 20 | 67% | 0 | 0% | 10 | 33% | 30 | 0% |
| Building envelope specialists | 10 | 50% | 0 | 0% | 20 | 100% | 20 | 0% |
| Plant mechanics/fitters | 10 | 50% | 0 | 0% | 20 | 100% | 20 | 0% |
| Glaziers | 0 | 0% | 0 | 0% | 10 | 100% | 10 | 0% |
| Steel erectors/structural | 0 | 0% | 0 | 0% | 0 | 0% | 0 | 0% |
| Grand Total | 2,740 | 25% | 2,650 | 24% | 5,700 | 51% | 11,090 | 100% |

Source: Welsh Government (2015/16)

It is useful to identify the training providers who are producing the highest volumes of further education achievements in construction competence qualifications. Table 21 shows the top 20 training providers in Wales by achievement numbers, broken down by occupation in 2016.

The 20 providers here account for 98% of all further education qualifications in the sector and between them have good coverage across all occupations, with many also having particular specialisms. CITB is the largest of the providers overall with 2,140 achievements in 2016 (a 19% share), and occupationally is producing the highest number of achievements in wood trades, bricklayers, plastering and dry lining, painters and decorators, civil engineering operatives, scaffolders and other construction professionals and technical staff. Grwp Llandrillo Menai are the second largest provider with 1,080 achievements

(10% share), specialising in electrical trades and installation and plumbing and HVAC trades, and have the highest share of achievements in both these areas.

The availability of a construction course at a certain location can be subject to change, depending on what work is happening and the wider availability of skilled and/or unskilled labour. For training providers to deliver a qualification they will need the appropriate infrastructure such as the right equipment, machines and staff to carry out the training and assessment. Training providers would need an appropriate number of learners and finance to make the course viable, so provision can be subject to change.

Table 21: Top 20 providers of construction further education to Wales, by occupation – publically funded only

| Area Based | Provider | Wood trades & interior fit-out | Plumbing & HVAC trades | Bricklayers | Electrical trades & Installation | Plasterers and dry liners | Painters and decorators | Plant operatives | Civil engineering operatives nec.* | Specialist building operatives nec.* | Scaffolders | Other construction professionals | Floorers | Roofers | Construction Trades Supervisors | Construction managers | Building envelope specialists | Plant mechanics/fitters | Glaziers | Steel erectors/structural | Total (All trades) | % of Total |
|------------|-------------------------|--------------------------------|------------------------|-------------|----------------------------------|---------------------------|-------------------------|------------------|------------------------------------|--------------------------------------|-------------|----------------------------------|-----------|-----------|---------------------------------|-----------------------|-------------------------------|-------------------------|-----------|---------------------------|--------------------|------------|
| SE | CITB-Construction | 1,01 | 70 | 480 | 0 | 210 | 110 | 50 | 40 | 20 | 90 | 30 | 10 | 10 | 0 | 10 | 0 | 10 | 0 | 0 | 2,140 | 19% |
| Nort | Grwp Llandrillo | 180 | 240 | 120 | 180 | 140 | 30 | 30 | 30 | 40 | 0 | 10 | 10 | 50 | 20 | 20 | 10 | 0 | 0 | 0 | 1,080 | 10% |
| Nort | Coleg Cambria | 220 | 160 | 110 | 170 | 40 | 30 | 120 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 870 | 8% |
| SE | Cardiff and Vale | 180 | 350 | 80 | 40 | 40 | 100 | 0 | 0 | 0 | 0 | 0 | 30 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 840 | 8% |
| SW | Pembrokeshire | 220 | 300 | 120 | 90 | 40 | 20 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 810 | 7% |
| SW | Grwp NPTC Group | 200 | 120 | 140 | 150 | 110 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 770 | 7% |
| SE | Coleg y Cymoedd | 170 | 200 | 40 | 180 | 60 | 70 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 730 | 7% |
| SE | Coleg Gwent | 130 | 280 | 90 | 130 | 60 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 710 | 6% |
| SE | Neath Port Talbot | 110 | 240 | 40 | 20 | 80 | 10 | 0 | 10 | 10 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 520 | 5% |
| Nort | Grwp Llandrillo | 170 | 90 | 80 | 10 | 100 | 10 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 480 | 4% |
| SW | Gower College | 0 | 80 | 0 | 260 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 340 | 3% |
| SW | Swansea College | 80 | 130 | 20 | 10 | 20 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 290 | 3% |
| SW | Coleg Sir Gar | 40 | 70 | 50 | 90 | 10 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 270 | 2% |
| SE | Bridgend College | 60 | 100 | 50 | 10 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 250 | 2% |
| Nort | Coleg Cambria WBL | 40 | 70 | 0 | 20 | 10 | 0 | 80 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 230 | 2% |
| SE | ACT Ltd | 30 | 20 | 50 | 10 | 20 | 0 | 0 | 20 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 160 | 1% |
| SE | Merthyr Tydfil | 70 | 0 | 40 | 0 | 40 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 160 | 1% |
| SW | Ceredigion County | 20 | 30 | 50 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 110 | 1% |
| SE | Torfaen Training | 30 | 10 | 20 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 0 | 100 | 1% |
| SW | Coleg Ceredigion | 40 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 70 | 1% |
| | Grand Total (All | 3,01 | 2,61 | 1,63 | 1,39 | 1,00 | 500 | 290 | 150 | 110 | 90 | 80 | 60 | 50 | 40 | 30 | 20 | 20 | 10 | 0 | 11,09 | 100 |

Source: Welsh Government (2015/16)

9.4. Apprenticeships

Please note that apprenticeships are considered competence achievements within the construction sector so will be contained within the numbers in the previous section, i.e. they are not additional to the numbers of overall achievements in further education. However, this section isolates and analyses apprenticeships in their own right.

For construction operatives, apprenticeships will be one of the main routes that new entrants into the industry will use, especially learners who are between 16-24 years of age who are looking to enter from school or further education. Construction apprenticeships are well established and require a learner working towards completion of a framework, or programme of learning, which typically takes around two years for a level 2 with a further year if progressing to level 3. Throughout this time the apprentice would be employed.

As the industry emerges from a period of deep recession, during which contractors' order books were depleted and the appetite to take on apprentices was severely reduced, confidence is returning and numbers of apprentices are once again increasing. Table 22 details Apprenticeship starts within Wales.

Table 22: Construction apprenticeship starts Wales 2015/16

| 2015/16 | Foundation Apprenticeship (Level 2) | Apprenticeship (Level 3) | Higher Apprenticeship (Level 4+) | All apprenticeship programmes |
|---|-------------------------------------|--------------------------|----------------------------------|-------------------------------|
| Construction (Building - excluding Specialist) | 1,080 | 460 | . | 1,545 |
| Construction (Specialist) | 270 | 50 | . | 320 |
| Construction (Civil Engineering) - Apprenticeship | . | . | . | . |
| Construction (Civil Engineering) - Foundation Apprenticeship Direct Entry | 175 | . | . | 175 |
| Construction (Technical and Professional) | . | 85 | . | 85 |
| Electrotechnical | . | 1,270 | . | 1,270 |
| Fencing | . | . | . | . |
| Heating and Ventilation | 30 | 30 | . | 60 |
| Housing | 15 | 50 | . | 65 |
| Plumbing and Heating | 585 | 395 | . | 980 |
| Other Sector Frameworks - Construction | 45 | 50 | 20 | 115 |
| Construction Total | 2,200 | 2,395 | 20 | 4,615 |

Source: StatsWales (2015/16)

The data indicates the majority of Apprenticeships in Wales are Level 2, with a similar number at Level 3 but only 20 at Level 4+. Looking back since 2012/13 apprenticeship numbers are 420 up in 2015/16 compared to 2012/13, although down 230 compared to 2014/15. Over the period numbers fluctuate up and down with an average of 4,610 starts.

Current apprenticeship numbers split by regional area are presented in Appendix H. There is an even split (40%) of numbers in South East and SW & Mid Wales with 20% in North Wales.

A forecast of apprenticeship numbers based on the demand forecast is included in Appendix I. An 85% achievement rate based on the latest figures from Welsh Government is assumed. Apprenticeship numbers at level 4+ were too low to allow forecasting.

9.5. Higher education

Training for design, technical and construction management occupations within the potential Welsh workforce will be focused on qualifications at level 4 and above and typically take the form of degrees and postgraduate degrees, i.e. higher learning.

Further education colleges are increasingly offering training at higher qualification levels, causing some crossover with higher education providers, but degree-based and postgraduate qualifications remain the main area of training at this level, delivered either by or in partnership with a university.

In considering higher education achievement, this research has focused on an overview of Wales as a whole, considering only UK domiciled students. Figure 33 shows the volumes of first degree, postgraduate degree and other undergraduate achievements from 2006/07 to 2014/15. The trend is for increasing numbers up until a peak of 1,195 achievements in 2009/10, at which point the trend is reversed and numbers have since suffered a decline down to 835 achievements in the last year of available data, 2014/15, a drop of 30%.

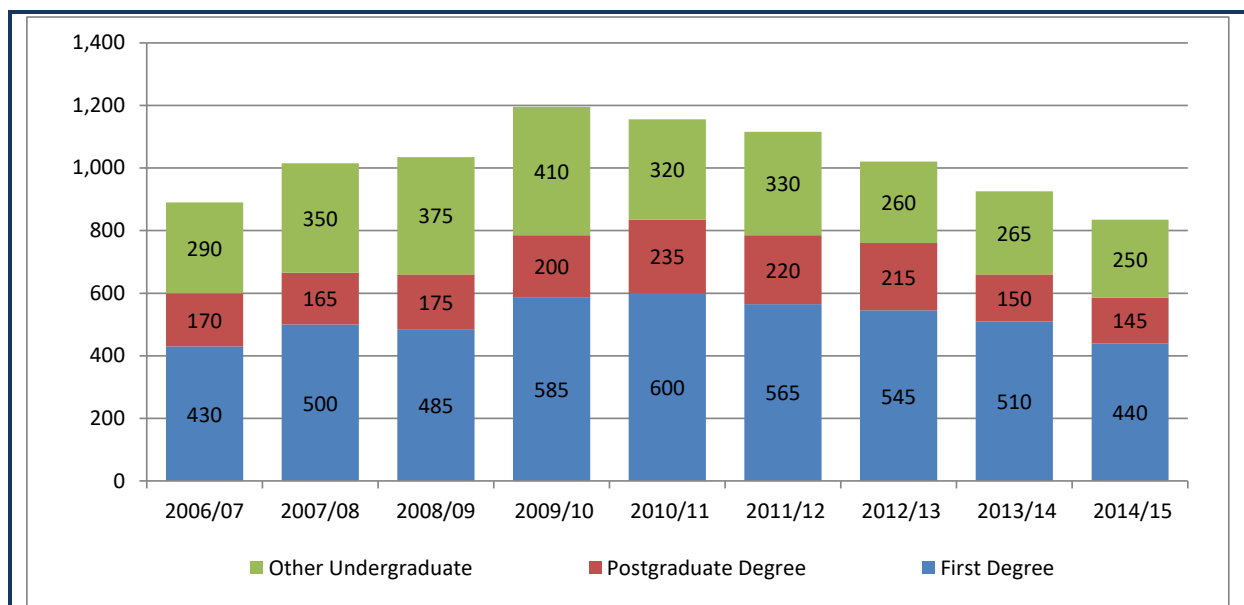


Figure 33: UK domicile first degree, postgraduate degree and other undergraduate achievements, Wales 2006/07 to 2014/15, HESA

Figure 34 shows achievements by subject area. The building subject area covers a range of degree qualifications such as construction management and chartered surveying, whereas architecture and civil engineering are much more highly focused.

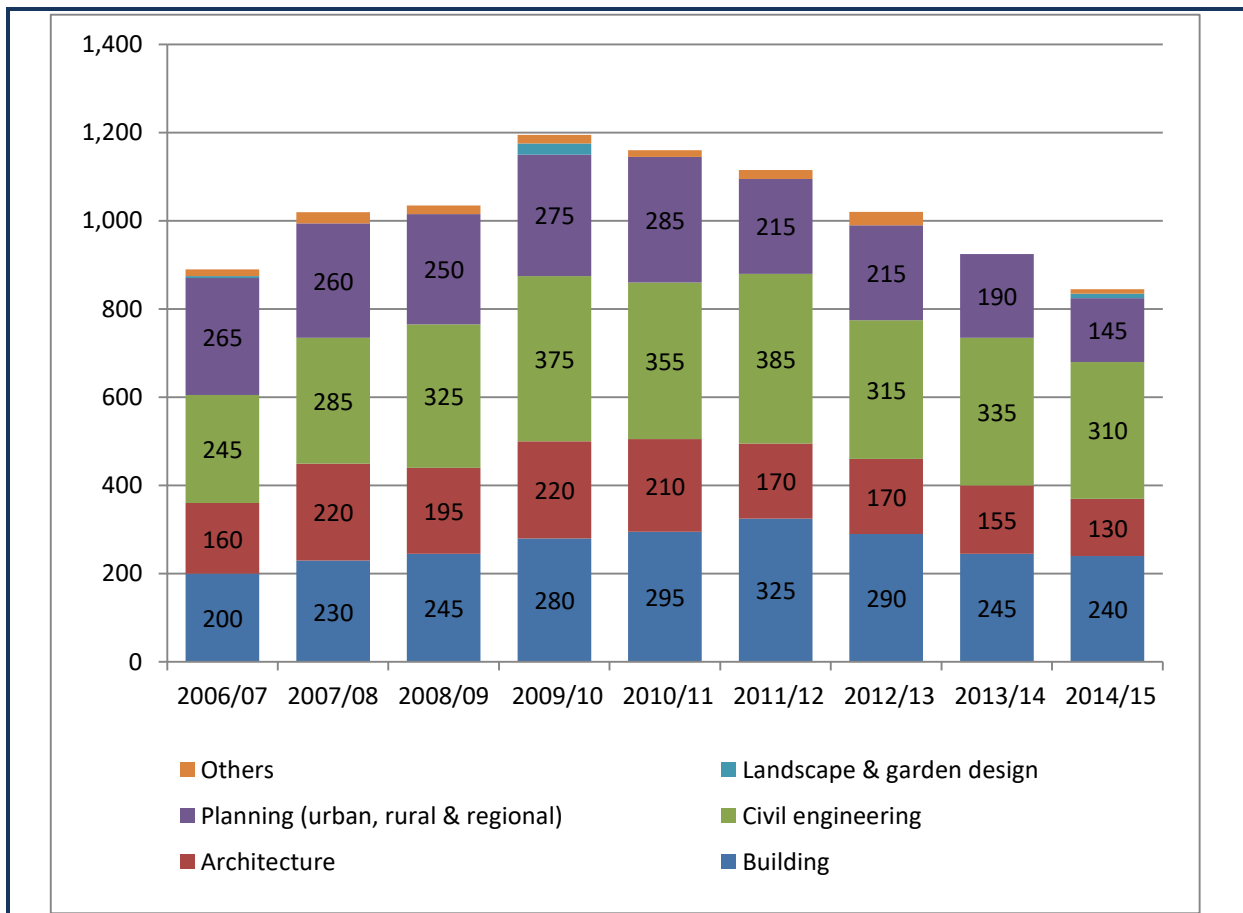


Figure 34: UK domicile first degree, postgraduate degree and other undergraduate achievements by subject area, Wales 2006/07 to 2014/15, HESA

Figure 34 shows the extent to which reductions in numbers have been across subject areas. Planning has suffered the biggest fall since 2009/10 of almost 50% with declines also evident in Architecture 41% down. Although not a core subject area for construction there is very limited provision in landscape and garden design in Wales.

Table 23 shows the top providers in volume terms per subject area in order to provide an indication as to where the highest numbers of achievements are coming from. Cardiff University is the top provider for Architecture and Planning and joint top provider with University of South Wales for Civil Engineering. For Building related subjects the University of South Wales is the top provider.

Table 23: UK domicile first degree, postgraduate degree and other undergraduate achievements by top 10 providers per subject area, UK 2014/15

| Top Providers: Building | Total | % of Total |
|---|------------|-------------|
| University of South Wales | 120 | 50% |
| University of Wales Trinity Saint David | 90 | 38% |
| Glyndŵr University | 20 | 8% |
| Cardiff Metropolitan University | 10 | 4% |
| Total | 240 | 100% |

| Top Providers: Architecture | Total | % of Total |
|---------------------------------|------------|-------------|
| Cardiff University | 80 | 62% |
| Cardiff Metropolitan University | 40 | 31% |
| Glyndŵr University | 10 | 8% |
| Total | 130 | 100% |

| Top Providers: Civil engineering | Total | % of Total |
|---|------------|-------------|
| Cardiff University | 110 | 35% |
| University of South Wales | 110 | 35% |
| Swansea University | 40 | 13% |
| University of Wales Trinity Saint David | 30 | 10% |
| Glyndŵr University | 20 | 6% |
| Total | 310 | 100% |

| Top Providers: Planning (urban, rural & regional) | Grand Total | % of Total |
|--|-------------|-------------|
| Cardiff University | 105 | 75% |
| Cardiff Metropolitan University | 25 | 18% |
| Glyndŵr University | 10 | 7% |
| Total | 140 | 100% |

Source: HESA (2014/15 dataset)

One final aspect relevant to design, technical and construction managerial qualifications that should be noted is that there can be the need for a worker to be a member of a relevant professional body or institution, for example:

- Architects – the Royal Institute of British Architects
- Chartered Surveyors – the Royal Institution of Chartered Surveyors
- Civil Engineers – the Institution of Civil Engineers
- Town Planners – the Royal Town Planning Institute.

This can require a period of professional accreditation when the student is in work after achievement of their degree, which extends the time that it takes for someone to be considered competent in their role after having achieved their initial qualification.

9.6. Qualifications in the construction workforce

The qualification profile of the existing workforce is shown in Table 24. For the occupations involved in the design and construction management roles, the main qualification level is at NVQ level 4 and above, with 62% of the workforce qualified to this level. For the construction operative occupations there are far smaller percentages of the workforce qualified at level 4 and above with most being qualified at level 2 and level 3. However for the construction operative occupations around 31% of the workforce does not have a qualification at level 2 or higher.

Table 24: Qualifications profile of Welsh construction workforce, 2016

| | Design and construction management | Construction operatives |
|---|------------------------------------|-------------------------|
| First degree | 25% | 1% |
| NVQ Level 4 and above (including First degree) | 62% | 13% |
| NVQ level 3 | 15% | 25% |
| Trade Apprenticeships | 3% | 18% |
| NVQ level 2 | 8% | 13% |
| All with NVQ level 2 & above | 88% | 70% |
| Below NVQ level 2 | 5% | 14% |
| Other qualifications | 6% | 11% |
| No qualifications | 1% | 6% |

Source: ONS Labour Force Survey (2016)

Qualification levels can vary depending upon occupation. For example research showed that⁸:

- Three quarters of construction workers in Wales say they had no formal qualifications when they first started working in the construction industry (76% compared to 75% across the UK).
- By current trade/occupation the proportion of workers that started their construction careers with no formal qualifications is highest amongst dryliners and banksmen (all of the small sample in these occupations) and plant/machine operatives (96%), whilst plumbers (31%) are least likely to have started with no formal qualifications.
- Compared with around a quarter of construction workers in Wales that did have qualifications when they first started working in construction, overall more than half of all construction workers reported holding some sort of construction related qualification at the time of interview (58% compared to 63% across the UK). This is significantly fewer than in 2012 (70%).
- The proportion of workers that currently hold any qualifications is lower than average amongst workers aged 45+ (45%).
- By trade/occupation, site managers are most likely to hold qualifications (87%), whilst trades less likely to hold formal qualifications include those working as labourers/general operatives (38%) and plant/machine operatives (39%).
- The qualifications most likely to be held by construction workers in Wales are NVQ/SVQ qualifications (63% of those with qualifications) and this is a similar proportion to that reported in 2012 (67%) and the UK average (66%). Around 1 in 5 construction workers with

⁸ Workforce Mobility and Skills in the UK Construction Sector 2015 (CITB)

qualifications hold City & Guilds qualifications (21% compared to 23% in 2012 and 20% across the UK in 2015).

The research also showed that about one in eight construction workers in Wales are currently working towards any formal qualifications relevant to the construction industry (12% compared to 13% in 2012 and a UK average of 12%). Workers are more likely to undertake training if they were directly employed by a company, and as noted earlier, the construction sector has high levels of self-employment. Finally, demonstrating work competence along with health and safety requirements are the two main drivers for workers taking qualifications.

9.7. Summary of construction workforce training

- In 2016, in Wales Ofqual data indicates 9,750 FE qualification achievements, split one third (34%) competence based and the remaining two thirds (66%) knowledge based.
- Data from Statwales indicates 4,615 construction apprenticeship starts in 2015/16. The data indicates the majority of construction related apprenticeships in Wales are level 2, with a similar number at level 3 but only 20 at Level 4+.
- In Higher Education the trend is for increasing numbers up until a peak of 1,195 achievements in 2009/10, at which point the trend is reversed and numbers have since suffered a decline down to 835 achievements in the last year of available data, 2014/15, a drop of 30%.
- For the occupations involved in design and construction management roles, the main qualification level is at NVQ level 4 and above, with 62% of the workforce qualified to this level. For construction operative occupations there are far smaller percentages of the workforce qualified at level 4 and above with most being qualified at level 2 and level 3.

10. Comparing demand against supply

This section of the report compares the forecast demand to current employment and highlights potential pinch-point occupations.

10.1. Gap analysis

Table 25 compares forecast demand to current employment to create a risk factor by occupation and regional area. Any cells with risk factor >1 are highlighted red as potential pinch-point occupations where forecast demand is likely to exceed current employment and in this case, taking into account levels of current training.

The table categorises potential shortfalls in employment for each occupation into high, medium or low risk of shortfall based on the potential magnitude of shortfall, taking into account levels of current training.

The column LFT forecast risk compares the risk of shortfall between the Labour Forecasting Tool forecast in this report to current employment, taking into account levels of current training.

The column CSN ARR risk compares the risk of shortfall between the CSN Annual Recruitment Requirement compared to current training levels. The final column overall risk combines the risks, taking an overall view on potential shortages identified using the 2 forecast measures (LFT and CSN ARR compared to current training supply). Due to the differing technical forecasting methodologies some variation at occupational level is expected which is the reason for categorising an overall risk.

It should be noted that the LFT analysis carried out in this report is able to explore construction projects on a more granular level and is therefore able to highlight occupational skills gaps in a very detailed way

Appendix J shows the gap analysis with estimates of current training. It is important to note that training levels will need to exceed forecast demand as not all those that complete training may wish to work in the construction sector; tables should not therefore be interpreted as indications of over-supply of training. The analysis in this section focuses on quantitative comparison of forecast demand numbers with current employment. Additional qualitative consideration with local training providers and other government stakeholders may be useful to interpret findings from this analysis into appropriate strategies for the future.

Table 25: Gap analysis current Welsh construction workforce compared to peak demand forecast

| Occupation | LFT forecast demand risk factor | | | | Overall LFT forecast risk | Overall CSN ARR forecast risk | Overall risk |
|------------------------------------|---------------------------------|-----------------|------------------|---------------|---------------------------|-------------------------------|--------------|
| | North Wales | SW & Mid. Wales | South East Wales | Overall Wales | | | |
| Senior, exec. & business managers | 0.88 | 0.87 | 1.18 | 1.02 | Medium | Medium | Medium |
| Construction project managers | 0.92 | 0.89 | 1.20 | 1.04 | Medium | Medium | Medium |
| Other construction process | 0.85 | 0.83 | 1.12 | 0.97 | Low | Low | Low |
| Non-construction professionals | 0.89 | 0.87 | 1.18 | 1.02 | Low | Low | Low |
| Construction trades supervisors | 0.81 | 0.76 | 1.00 | 0.88 | Low | Medium | Medium |
| Wood trades and interior fit-out | 0.90 | 0.88 | 1.24 | 1.05 | Medium | Low | Medium |
| Bricklayers | 0.94 | 0.95 | 1.33 | 1.13 | High | Low | Medium |
| Building envelope specialists | 0.92 | 0.95 | 1.33 | 1.12 | High | Medium | High |
| Painters and decorators | 0.98 | 0.95 | 1.29 | 1.11 | High | Low | Medium |
| Plasterers and dry liners | 0.76 | 0.74 | 1.01 | 0.87 | Low | Low | Low |
| Roofers | 0.85 | 0.85 | 1.17 | 1.00 | Low | Low | Low |
| Floorers | 1.02 | 0.97 | 1.34 | 1.15 | Medium | Low | Medium |
| Glaziers | 0.92 | 0.91 | 1.24 | 1.06 | Medium | Medium | Medium |
| Specialist building operatives | 0.85 | 0.86 | 1.13 | 0.99 | Low | Low | Low |
| Scaffolders | 0.89 | 0.89 | 1.17 | 1.02 | Low | Low | Low |
| Plant operatives | 0.76 | 0.82 | 1.02 | 0.90 | Low | Low | Low |
| Plant mechanics/fitters | 0.91 | 0.95 | 1.20 | 1.06 | High | High | High |
| Steel erectors/structural | 0.63 | 0.69 | 0.88 | 0.76 | Low | Low | Low |
| Labourers | 0.80 | 0.81 | 1.07 | 0.93 | Low | Low | Low |
| Electrical trades and installation | 0.93 | 0.88 | 1.20 | 1.04 | Medium | Low | Low |
| Plumbing and heating trades | 0.91 | 0.87 | 1.22 | 1.04 | Medium | Low | Low |
| Logistics | 0.80 | 0.79 | 0.97 | 0.88 | Low | Low | Low |
| Civil engineering operatives | 0.82 | 0.75 | 0.70 | 0.74 | Low | Low | Low |
| Non-construction operatives | 0.84 | 0.83 | 1.07 | 0.94 | Low | Low | Low |
| Civil engineers | 0.98 | 0.88 | 1.13 | 1.02 | Low | Low | Low |
| Other construction professionals | 0.68 | 0.67 | 0.93 | 0.80 | Low | Low | Low |
| Architects | 0.84 | 0.87 | 1.23 | 1.03 | Medium | Low | Medium |
| Surveyors | 0.89 | 0.89 | 1.26 | 1.06 | High | Low | Medium |
| Total | 0.87 | 0.85 | 1.16 | 1.00 | Low | Low | Low |

10.2. Potential shortage occupations

Table 25 identifies the following as high overall risk of shortfall occupations:

- Building envelope specialists.
- Plant mechanics / fitters.

The following are identified as medium risk of shortfall occupations:

- Senior, executive, and business process managers.
- Construction project managers.
- Construction trades supervisors.
- Wood trades and interior fit-out.
- Bricklayers.
- Painters and decorators.
- Floorers.
- Glaziers.
- Architects.
- Surveyors.

10.2.1. Construction specific occupations

Forecast demand for building envelope specialists, wood trades and interior fit-out, bricklayers, painters and decorators, floorers and glaziers appears high in comparison to existing training in Wales. Entry to these professions is normally through work experience and training, NVQs are perhaps the quickest way to get qualified with early levels taking up to a year to complete. Of course, it can take much longer to become fully skilled and experienced – workers could potentially travel from neighbouring English regions as demand fluctuates – there is also some limited training available in Wales and training available in neighbouring English regions which could potentially flex depending on demand.

Demand for construction project managers and construction trades supervisors is also quite high in comparison to existing training in Wales. These workers could learn on the job and workers may come through either trade occupations or through professional specialisms such as civil engineering. Training to support these workers could be a mixture of higher or further education NVQ L4+ qualifications or it may be that some workers have taken other short duration courses.

The demand for architects and surveyors is linked to an increasing demand for higher level skills that sits across construction in general. As well as a degree or equivalent qualifications there is a requirement for two years of practical experience to become a chartered architect and similar practical experience to become a chartered surveyor, so the only way that demand in these occupation can be met in the short-term is by recruiting workers from outside Wales. Given their integral nature to every part of the construction process, especially at the commencement of construction activities, supply of skilled workers in this occupation will need consideration.

10.2.2. Cross sector occupations

Senior, executive and business process managers is a broad category that covers occupations such as chief executives, financial managers and directors, marketing and sales directors, purchasing managers and IT project managers. Workers for these occupations could come from all sectors. There tends to be suitable training provision across the UK although it will take time for new graduates/entrants to develop the necessary experience needed to operate at a professional level. The construction sector will need to promote itself well to ensure it is able to recruit and retain the best new entrants.

Plant mechanics / fitters covers occupations such as vehicle technicians, mechanics and electricians. Workers for these occupations may come from other related sectors. Entry to these professions is normally through work experience and training, NVQs are perhaps the quickest way to get qualified with early levels taking up to a year to complete. It would likely be relatively straightforward to recruit workers from other sectors.

The occupational category of Non construction professional, technical, IT, and other office-based staff (excl. managers) is also a broad category that covers occupations such as IT operations and support technicians, solicitor and legal professionals, estate agents, accountant and financial project management professional. As with senior, executive, and business process managers there tends to be suitable training provision across the UK although it will take time for new graduates/entrants to develop the necessary experience needed to operate at a professional level. However, this occupational area is of significant importance to the Welsh construction sector as workers form a considerable part of the supply chain and are critical to the successful execution of projects and general operational running of construction companies. Routes into the construction sector will be very different from trade and other professional pathways and the key driver in this occupational category is recruitment of quality workers and the retention of those workers in the construction sector.

10.3. Gap analysis training needs

In the analysis of construction training data for Wales there appear to be some areas of limited provision.

In particular within the further education datasets there is very limited NVQ Level 4+ management construction related training within Wales. Similarly, training provision for roofers, floorers and glaziers appears quite limited within Wales. Another area of limited training provision is for steel erectors/structural fabrication although the forecast does not identify a shortfall in this occupation.

For higher education, training provision broadly appears to match the forecast demand except for architects and surveyors where provision is available although numbers are not as high within Wales as forecast demand. It may be possible to flex existing provision for architects and surveyors although discussion would be needed with providers. Although not a core construction area there was very limited higher education training identified for landscape and garden design.

11. Conclusions and Recommendations

11.1. Demand summary points

- Labour demand arising from the construction spend in **North Wales** is about 22,000 people in 2017, taking account of estimates of other work including R&M in addition to the denominated project pipeline of projects.

- During 2017 the most labour-intensive occupation group is “non-construction professional, technical, IT and other office-based staff” with an annual demand of 2,200 people.
- The estimate of labour demand for the trade occupations for the peak year of 2017 with the highest demand is “Wood trades and interior fit-out” with 2,850 people; “Electrical trades and installation” trades follow with 1,450 people and “Plumbing and heating, ventilation, and air conditioning trades” rank third, with a demand of 1,900 people.
- Labour demand arising from the construction spend in **South East Wales** is around 58,700 people in 2017, taking account of estimates of other work including R&M in addition to the denominated project pipeline of projects.
- During 2017 the most labour-intensive occupation group is “non-construction professional, technical, IT and other office-based staff” with an annual demand 5,850 people.
- The estimate of labour demand for the trade occupations for the peak year of 2017 are highest “Wood trades and interior fit-out” with 7,750 people; “Electrical trades and installation” trades follow with 3,700 people and “Plumbing and heating, ventilation, and air conditioning trades” rank third, with a demand of 5,150 people.
- Analysis of the labour demand arising from the construction spend in **South West and Mid Wales** is about 27,580 people in 2017, taking account of estimates of other work including R&M in addition to the denominated project pipeline of projects.
- During 2017 the most labour-intensive occupation group is “non-construction professional, technical, IT and other office-based staff” with an annual demand of 2,750 people.
- The estimate of labour demand for the trade occupations for the peak year of 2017 are highest is “Wood trades and interior fit-out” with 3,550 people; “Electrical trades and installation” trades follow with 1,750 people; and “Plumbing and heating, ventilation, and air conditioning trades” rank third, with a demand of 2,350 people.
- Overall analysis of the labour demand arising from the construction spend in **Wales** is about 108,450 people in 2017, taking account of estimates of other work including R&M in addition to the denominated project pipeline of projects.
- During 2017, the peak year of the denominated pipeline demand, the most labour-intensive occupation group is “non-construction professional, technical, IT and other office-based staff” with an annual demand of 14,150 people.
- The estimate of labour demand for the trade occupation for which demand is highest is “Wood trades and interior fit-out” with 14,150 people; “Electrical trades and installation” trades follow with 6,850 people; and “Plumbing and heating, ventilation, and air conditioning trades” rank third, with a demand of 9,450 people.

11.2. Supply summary points

- In Wales the total construction workforce is 108,470. In Wales and across all of the neighbouring regions growth in the construction workforce is projected to 2022.
- As construction accounts for around 7% of the Welsh workforce, the construction workforce profile largely mirrors the age profile of all industries in Wales - there is an ageing workforce (17% of the Welsh construction workforce is aged 55+, similar to all industries 20%).

- Research⁹ into mobility carried out in 2015 showed that the average travel to work distance for a Welsh construction worker was 16 miles which compares closely to the UK average 22 miles.
- In Wales 4.8% (4,850) of the construction workforce is overseas born (3% overseas born non-UK citizen and 1.8% overseas born UK citizen).
- The data indicates the majority of Apprenticeships in Wales are Level 2, with a similar number at Level 3 but only 20 at Level 4+. Looking back since 2012/13 apprenticeship numbers are 420 up in 2015/16 compared to 2012/13, although down 230 compared to 2014/15. Over the period numbers fluctuate up and down with an average of 4,610 starts.
- Current apprenticeship numbers split by regional area are presented in Appendix H of this report. There is an even split (40%) of numbers in South East and SW & Mid Wales with 20% in North Wales.
- In 2016, in Wales Ofqual data indicates 9,750 FE qualification achievements, split one third (34%) competence based and the remaining two thirds (66%) knowledge based.
- Data from Statwales indicates 4,615 construction apprenticeship starts in 2015/16. The data indicates the majority of construction related apprenticeships in Wales are level 2, with a similar number at level 3 but only 20 at Level 4+.
- In Higher Education the trend is for increasing numbers up until a peak of 1,195 achievements in 2009/10, at which point the trend is reversed and numbers have since suffered a decline down to 835 achievements in the last year of available data, 2014/15, a drop of 30%.
- For the occupations involved in design and construction management roles, the main qualification level is at NVQ level 4 and above, with 62% of the workforce qualified to this level. For construction operative occupations there are far smaller percentages of the workforce qualified at level 4 and above with most being qualified at level 2 and level 3.
- In terms of identifying potential skills gaps and shortages the following occupational groups are classed as high risk and require consideration of intervention: Building envelope specialists and Plant mechanics / fitters.
- The following occupational groups are identified as medium risk and require consideration of intervention: Senior, executive, and business process managers, Construction project managers, Construction trades supervisors, Wood trades and interior fit-out, Bricklayers, Painters and decorators, Floorers, Glaziers, Architects and Surveyors.

11.3. Recommendations

This granular study encapsulates a significant amount of data and information, brought together to represent a picture of the construction industry in Wales. The limitations of a study of this nature is that no two datasets are the same and therefore information fed into any forecasting model has a number of assumptions attached, all of which we have stated in our methodology.

Equally when comparing demand and supply the data isn't naturally aligned so we have made sensible assumptions to enable a realistic 'gap analysis' to be created. Throughout the study the 'number crunching' has been supported by qualitative feedback from stakeholders and we have attempted to supplement research with local knowledge where possible.

⁹ Workforce Mobility and Skills in the UK Construction Sector 2015 (CITB)

However, this is the starting point for building the detailed evidence for Wales, split into sub-regional analysis and we will continue to work with Welsh stakeholders to inform and drill down into research areas that warrant further analysis. The following recommendations are intended as a guide and in many cases will seek to highlight and compliment work that is already taking place across Wales as industry and Regional Skills Partners work together with organisations such as CITB to promote change and investment in construction.

Recommendation 1

Develop a ‘Wales Construction Skills Strategy’ in collaboration with the regional and learning skills partnerships, to deal with emerging skills gaps

The report outlines occupations across Wales and at sub-regional level where potential skills gaps exist. It also outlines the occupations which in the longer term are at risk. The evidence base gives stakeholders the opportunity to develop both local and an ‘across Wales’ strategy for addressing occupations at risk through both short term interventions, where appropriate, and longer term planning. The ability to now ‘test demand’ using the Labour Forecasting Tool and create scenarios gives both Wales and its sub-regional areas the ability to examine the impact of a project on the available labour pool in Wales at occupational level. The strategy should also explore the wider picture relating to skills provision. Some occupational groups always drive demand and this is consistently represented across Wales by wood trades and interior fit out, electrical and installation and plumbing and heating related occupations. This is fairly standard and a healthy supply of labour in these occupations is essential and equally requires continuous and consistent provision. The recommendation is that stakeholders work together in full collaboration with the regional and learning skills partnerships at both the sub-regional and all Wales level to formulate a plan to alleviate skills gaps through training, upskilling, attracting new entrants through other sectors and incentivising the right people into the right occupations where demand is prevalent.

Recommendation 2

Partner in outreach opportunities- build a more positive image of construction with young people and increase recruitment through new entrants, career changers and reskilling.

The Careers, Information, Advice and Guidance (CIAG) agenda receives considerable attention at a national level and across Wales. Numerous incentives and campaigns exist to support youth into construction and managing the image of the industry remains a constant challenge, given its often negative and inaccurate stereotype. Partners need to continue to build a positive image of construction for young people (including apprenticeships), career changers and occupational movement across the industry. Campaigns targeting ethnic minorities and women into the industry seek to draw on untapped resources. Industry led initiatives such as Go Construct (www.goconstruct.org) inspire individuals to find out more about the sector and employer led school engagement campaigns support the positive image projected through CIAG approaches. At both a sub-regional and all Wales approach stakeholders need to continue to work together to support this process, working with organisations like Career Wales. CITB has recently commissioned specific research into CIAG activity and for the first time this will have a specific Wales focus. Stakeholders should continue to work together on this significant range of activities and review this study when published (Autumn 2017) to identify further actions.

Recommendation 3

Develop curriculum that is demand led

Working with the results of this report and other significant studies stakeholders should assess how they can work with the educational sector and Welsh Government to inform future planning of the curriculum delivered across Wales. The evidence base presented should be utilised to inform educational establishments at local level which occupations across the construction sector are needed

and assess what training can be delivered as short-term interventions and what requires longer planning opportunities.

Collaborating on course delivery is an ideal way of expanding capacity but is not always practical due to geographical challenges, however, where possible the alignment of training offers should be considered to maximise efficiency of delivery. In general Wales has a good range of provision on offer, with 20 further education providers providing 98% of all courses. Clearly financial viability is critical to the offer of any provision but having a constant forward view of demand should now enable more effective decision making regarding future curriculum development and this should be supported by industry at local contractor level where possible.

Recommendation 4

Build on Welsh Apprenticeship Achievements

Apprenticeships achievements in the construction sector need to contribute significantly towards the 100,000 all-age, all-sector target the Welsh government have set for this Assembly term. This includes a proportional increase in higher and degree apprenticeships

Achievement of apprenticeships in Wales exceeds the UK average substantially (85% achievement rate compared to 70%). This progress needs to be built on and the report provides a realistic forecast of apprenticeship achievement across the sub-regional areas, based on future demand. Significant projects, as they enter the forecast will present substantial apprenticeship opportunities (such as Wylfa in North Wales) and stakeholders across the sub-regions needs to work together with employers and providers to establish how a proportion of these apprenticeship opportunities can be moved from the more common level 2 into levels 3 & 4 to capitalise on creating a higher level of attainment for Wales. Balance is essential, as educational achievement at all levels provides an essential mixed workforce but the move towards higher educational achievement goals needs to be incentivised and proactively supported and this starts with understanding the evidence available.

Recommendation 5

Maintain the evidence base to support and inform future decision-making and commission further research in specific areas

As stated throughout this report, this evidence base is just the start of understanding construction activity in Wales at a more granular level. Demand will change as projects reach completion and new projects enter and fallout of the pipeline. A report of this nature is a 'snapshot in time' but provides enough detail to inform debate and enable decision making in a sensible way.

Any detailed future analysis should be driven through stakeholder agreement and link into complimenting and informing initiatives such as the National Infrastructure Commission for Wales which explores and prioritises medium to long term investment for Wales

Our recommendation is that the demand forecasts are updated 6 monthly. The supply of labour data has an inbuilt lag effect and should realistically be updated annually. Therefore an annual report and an interim report would be the best option, depending upon stakeholder views and needs.

Also the Labour Forecasting Tool can be utilised to assess demand on projects in-between as a scenario planner too. The aim would be to also build upon the evidence base, identifying areas where we need to go deeper and conduct further specific research, both quantitative and qualitative in nature.

A recommendation for this report is that we conduct a further study into workforce mobility in Wales as local knowledge tells us that that Welsh workers are commuting into the South West and North West of England and non-Welsh workers are entering Wales to work too (so far limited data and information is available to support this theory regarding the construction sector). This will be incentivised by a whole range of variables including project availability, wages, logistics (including

changes to cost of travel via toll roads), career opportunities, etc. This movement of workers impacts on supply data and therefore it is important to understand the wider picture.