1 Photo courtesy of Bechtel Photo Library

HS2 – Jobs Analysis

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Chapter 1 Introduction

Overview

Albion Economics was asked by the Industry Leaders Group (ILG) established by Greengauge 21 (GG21) to undertake research into the direct and supply-chain job impacts of the proposed High Speed 2 (HS2) project. This work is seen by the ILG as an essential first step in developing a growing understanding of the skills development requirements for this exciting project.

Objectives

HS2, a new high-speed line linking London with the Midlands and the North, is currently in the planning stage. Government's aim is to secure powers in 2015 for the construction of phase 1 between London and the West Midlands, with the scheme opening in 2026. Phase 2, comprising routes to Leeds and Manchester and a spur to Heathrow, will follow on, opening in the 2030s. This research project aims to assess the jobs and skills required for the delivery and operation of HS2. Specifically, the project objectives are:

- To estimate the numbers of direct and indirect jobs that will be created by the construction and operation of HS2, in order to understand the significance of HS2 as an economic driver.
- To contribute evidence to the debate on how the public sector, engineering sector and railway industry can best be prepared for business development opportunities arising from HS2, including manpower and skills requirements of HS2.

Scope

This work sets out an estimate of the direct and indirect (supply chain) jobs that would be attributable to the high speed rail project being promoted by HS2 Ltd. It takes a broad approach to identifying the very wide range of jobs and opportunities associated with the project.

The scope of the analysis is

- all direct employment for the planning, design, construction and long-term renewals of the infrastructure and trains;
- indirect jobs from the supply chain;
- permanent jobs for the operation and maintenance of the system;
- all expected employment within the station footprints, including retail and catering units;

all measured in person-job years across the planned economic life of the project.

This work does not attempt to measure the induced jobs impact in the general economy of multiplier spending from HS2 direct and indirect jobs and incomes. It also excludes any regeneration impact to local economies in cities served by HS2, outwith station boundaries.

Evidence Base and Approach

The analysis has drawn upon a wide range of data sources and evidence. A full list of sources and those who have assisted in providing them is included as Appendix A. The findings, however, are an independent view of Albion Economics.

The approach has been to estimate job calculations from 'bottom up' principles wherever possible. Detailed relationships have been developed between cost budgets, physical outputs, wage rates and employment, by type of job and skill level, drawing on a number of evidence sources and 'coalface' industry expertise. This includes NSARE's published work on jobs and skills in the railway industry[1] (although it was not possible to utilise its detailed datasets), as well as benchmark evidence from other High Speed Rail projects, including HS1 and TGV. The approach work and outturn results have benefitted from review by ILG member organisations and been refined in light of such.

The calculations utilise disaggregate published budget data from HS2 Ltd based on the March 2012 cost and design freeze, together with other cost information provided from the same source.

[1] The National Skills Academy for Railway Engineering. Forecasting the Skills Challenge. January 2013.

Chapter 2 HS2 London – West Midlands

Overview

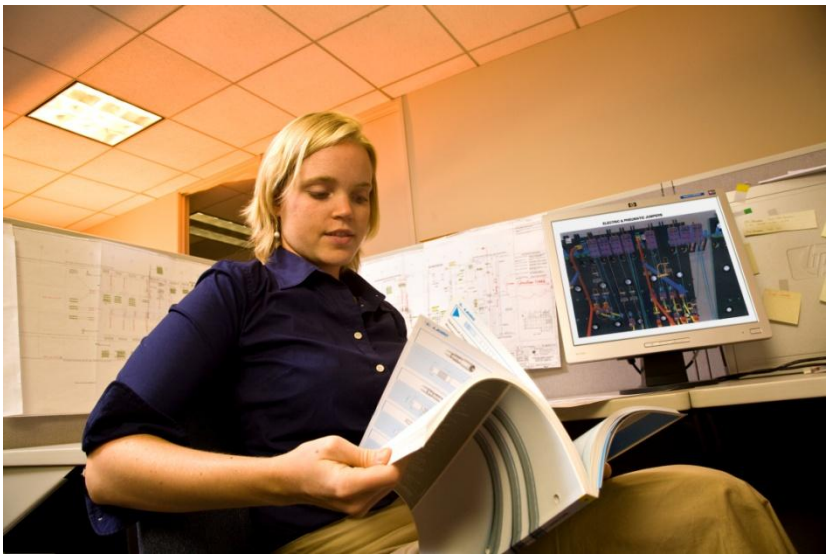
The planning and design process for the first phase of HS2 to the West Midlands is well underway, with construction expected to be in full progress by 2017, running through until 2026 when services would start operation. Four stations are planned at Euston, Old Oak Common, Birmingham Interchange and Birmingham Curzon Street. For operations and renewals jobs, a 60 year project life is assumed from start of service in 2026.

The analysis excludes any jobs that might be created should contingency budgets be required to complete the project. The estimates are conservative in this respect.

Planning and Design

Scope

Jobs include those at HS2 Ltd, both seconded civil servants and design and planning partner consultants as well as lawyers, IT, administration, communication and HR professionals. External consultancy contracts are included for environmental expertise, planning and for design and advisory work.



2 Photo courtesy of Bechtel Photo Library

Employment

Total job years are estimated at almost **23,000** across the period to 2026. The peak number of jobs in this category is around **3,500** in 2015/16. These figures include client-side management of design and construction contracts through to scheme opening.

Construction

Scope

These incorporate civil engineering jobs to build the structures, tunnels and stations for HS2 as well as railway engineering for the laying of the track and the design and installation of signalling, power

and control systems. These jobs cover the full range of engineering skill levels from labourers, through specialist signalling engineers to experienced engineers to implement detailed designs and project manage the complex process.

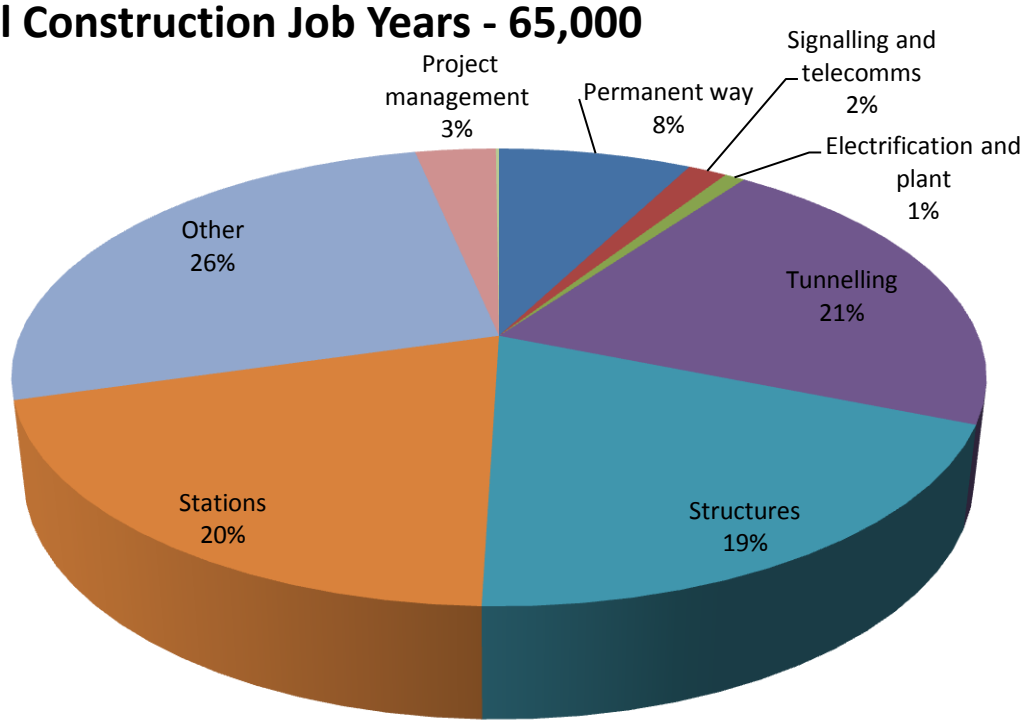
Employment

Total direct job years are estimated at **65,000** across the period to 2026, with the largest workforce expected in 2018/19 at more than **12,700**. These are direct jobs working on the construction of the line, and exclude 'supply chain' jobs involved in the provision of goods and services, which are considered below as indirect jobs.

3 Photo courtesy of Bechtel Photo Library

Figure 1 below shows the expected breakdown of construction jobs.

Figure 1 HS2 London-West Midlands Total Construction Job Years - 65,000



This shows that a large majority of jobs are in the civil engineering field in the construction of the tunnels, structures and stations, each of which account for broadly one-fifth of all jobs. Specialist railway engineering jobs only account for around 11% of projected employment, although these are on average more highly skilled. The 'other' category includes workers on utilities, preliminaries, ancillary and additional items as well as civil works that don't fall under then main civil engineering headings.

Supply chain

A jobs multiplier has been used to estimate the proportion of indirect jobs which would help supply the main construction contractors. Based on analyses of other major civil engineering projects, a multiplier of 1.5 has been adopted, which leads to a further **32,500** job years across the construction life of the London-West Midlands HS2 project. To ensure no double-counting, the sum of both direct construction and indirect supply-chain jobs is consistent with the total construction cost budget.

Rolling Stock

Scope

Jobs here would be in the design and manufacture of both the trains designed exclusively for HS2 operation and for those additional units needed to operate the classic compatible services.

4 Photo courtesy of Bechtel photo Library

Employment

Total job years are estimated as **20,500** for the manufacture of 61 trains. The maximum number of jobs at any one time is expected to be **6,500** around 2024. This uses benchmark relationships from existing train manufacturers.

Supply chain

There is evidence that indirect jobs multipliers are higher for rolling stock manufacture and a multiplier of 2.5 has been adopted, which leads to a further **30,800** job years for those working to supply train component parts.

Operations, Maintenance and Retail

Scope

These would be ongoing jobs associated with the operation and maintenance of the trains, stations and infrastructure, including jobs in retail and catering within the station footprint.

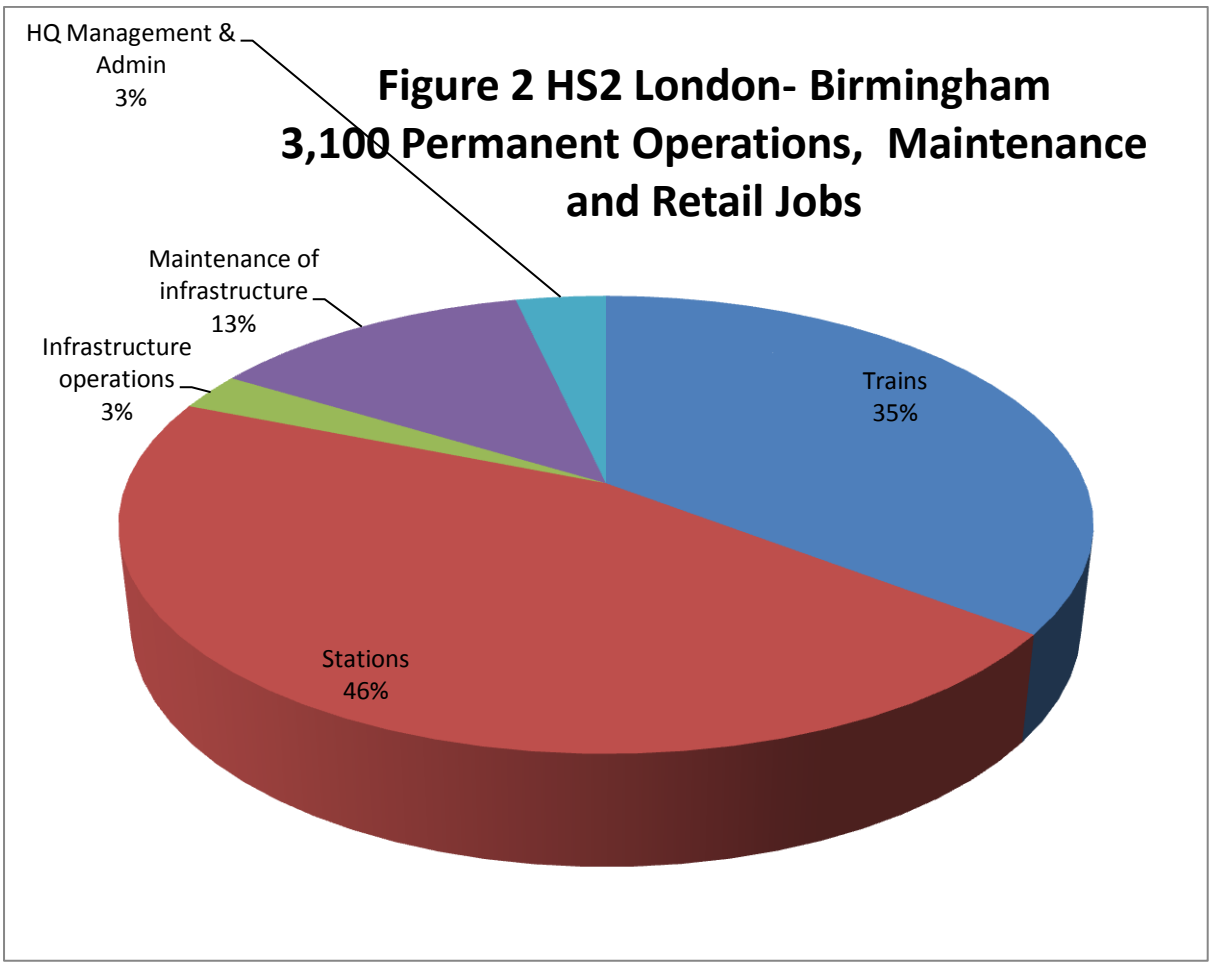
These would incorporate a very wide range of skilled and unskilled posts including drivers, train managers, catering and cleaning staff working on trains; platform and barrier staff, information, ticket office, car park, maintenance, facilities management, catering and retail jobs at stations; signalling operations and maintenance staff as well as those maintaining the remaining infrastructure. In addition, train and maintenance management jobs would be created as well as support functions on IT, HR, planning and passenger information.

Employment

A total of almost **3,100** permanent ongoing jobs are projected in operations, maintenance and retail. This equates to over **187,000** job years across the 60 year project life, on two simplifying assumptions:

- That any productivity gains over time are reinvested in customer facing staff;
- That staff are employed for training etc. in the 6 month period prior to full operation.

The breakdown of staff is shown in Figure 2 below. The location of the most jobs would be at stations, followed by on-train staff. Of the latter, approximately 250 would be train drivers. Station staff numbers are dominated by retail and catering jobs which would total around 1,100 of the 1,400+ projected staff at stations.



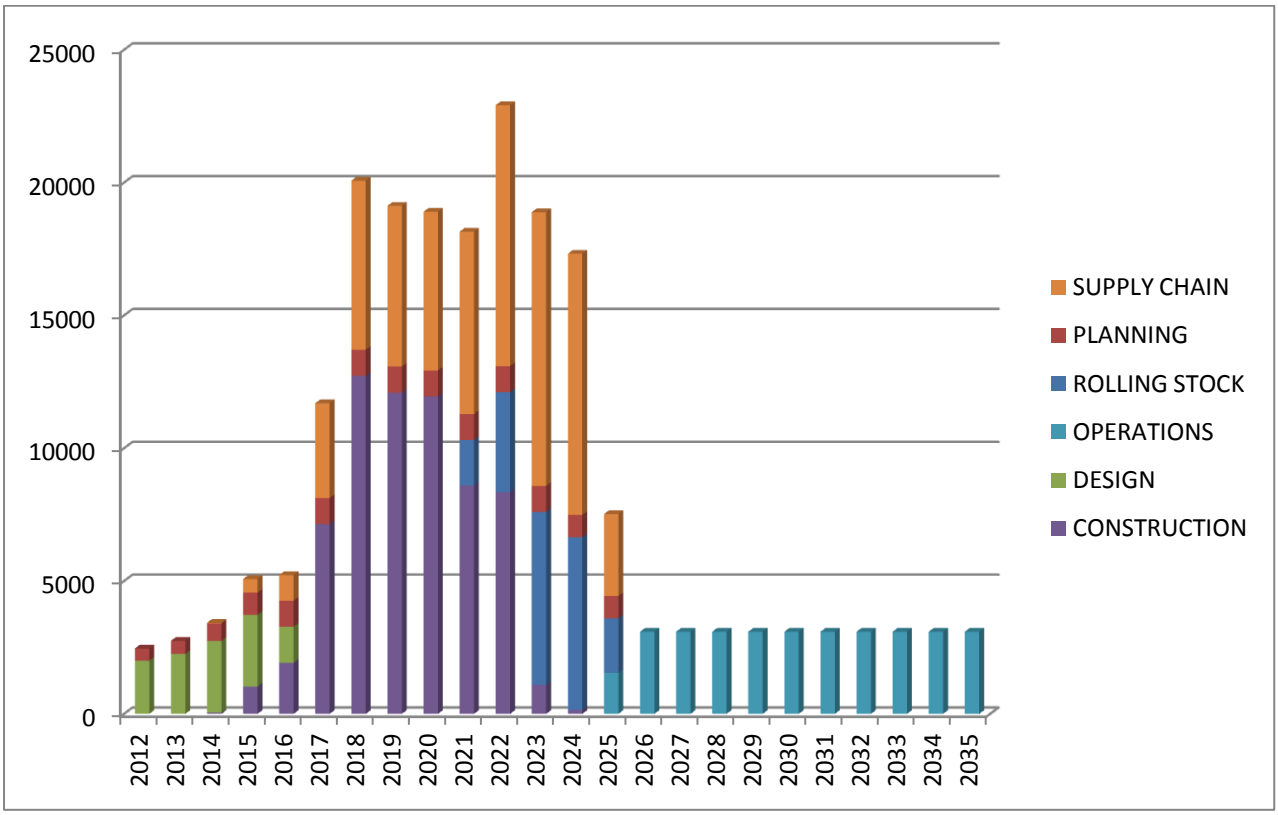
Renewals

No major renewals works are expected before 2039, so job estimates here are both more difficult to predict and will not provide immediate opportunities. Estimates have been based on renewals budgets programmed for the HS2 business case and on the simplifying basis of existing relationships between budget spend and jobs. This suggests that almost **65,000** job years would be required across the 60 year life of the London-Birmingham project.

Summary

Total job years projected for the London-West Midlands HS2 project are more than **423,000** across the 60 year life of the project**.** Figure 3 below shows the expected profile of jobs across the construction and initial operation period.

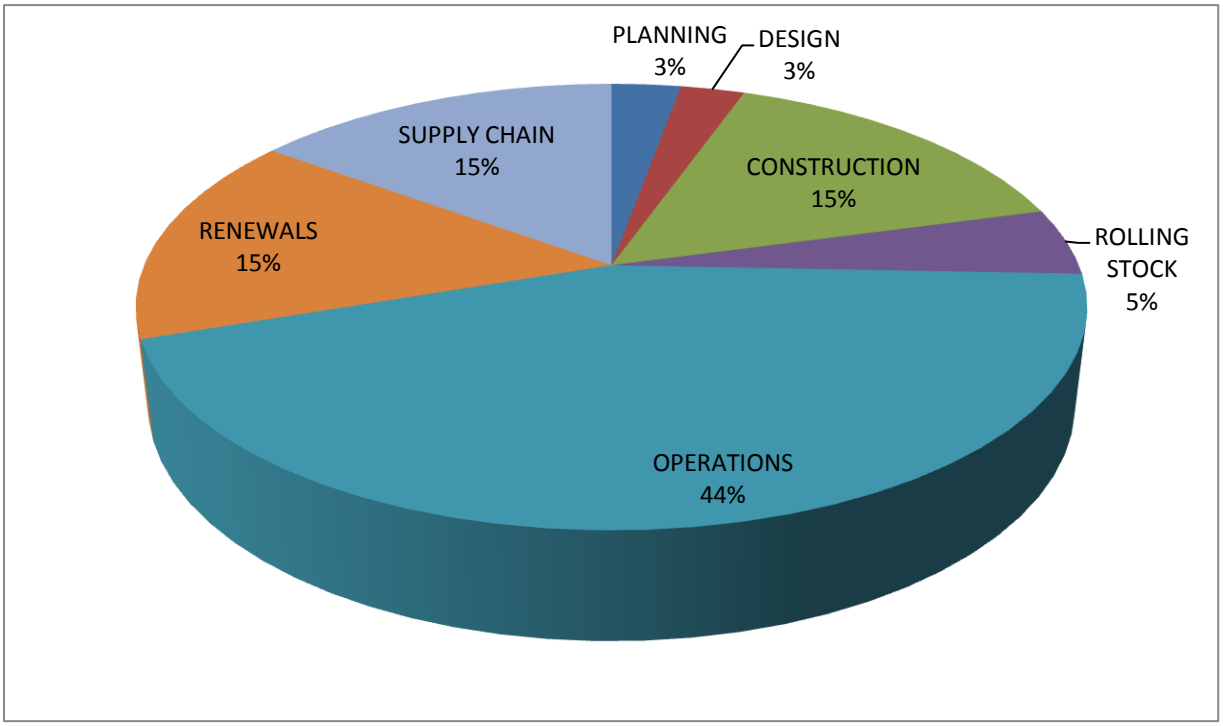
FIGURE 3: HS2 London - West Midlands - Jobs Profile



This demonstrates that job numbers will grow to around 5,000 by 2015 and then grow rapidly to 20,000 by 2018. Employment on the project will peak in 2022 with almost 23,000 jobs.

Figure 4 below shows how the whole project-life job years split by job area. This highlights that the permanent operations and maintenance jobs will form the largest job impact over time (44%) with construction, renewals and indirect (supply chain) jobs each taking 15%.

FIGURE 4: HS2 London - West Midlands - Job Years Disaggregation



Chapter 3 London – Leeds and Manchester – The Y Network

Overview

Phase 2 from the West Midlands to Leeds and Manchester is now expected to commence design work and preparation for Parliamentary powers in 2015. The cost design freeze from 2012 has preliminary construction work starting in 2021. The analysis takes this profile forward together with an expected start date of trains to Manchester and Leeds of 2032. Stations are planned at East Midlands, Sheffield Meadowhall, Leeds, Manchester Airport and central Manchester. This analysis excludes the Heathrow spur at this stage although it remains part of Phase 2, subject to the Davies Commission review. This Chapter presents the expected job impacts for the whole Y network, in order to help identify where resource requirements will peak as well as estimating total employment impacts of HS2.

Planning and Design

Scope

The scope of planning and design tasks is similar to Phase 1 but it is anticipated that lessons can be learnt and processes streamlined for Phase 2. The drivers for this analysis remain the planned budgets for planning and design work, together with internal HS2 Ltd resource costs.

Employment

Total job years are estimated at almost **49,000** across the period to 2032. The peak number of jobs in this category is around **3,500** in 2015/16.

Construction

Employment

Total direct job years are estimated at **139,000** across the period to 2032, with the largest workforce expected in 2024/25 at around **17,000** posts, excluding 'supply chain' jobs. Figure 5 below shows the breakdown of construction activity for the full 'Y' network project (i.e. for Phases 1 and 2 taken together). This confirms the dominance of civil engineering jobs for the construction of HS2, although tunnelling has a less significant role across the whole 'Y' network.

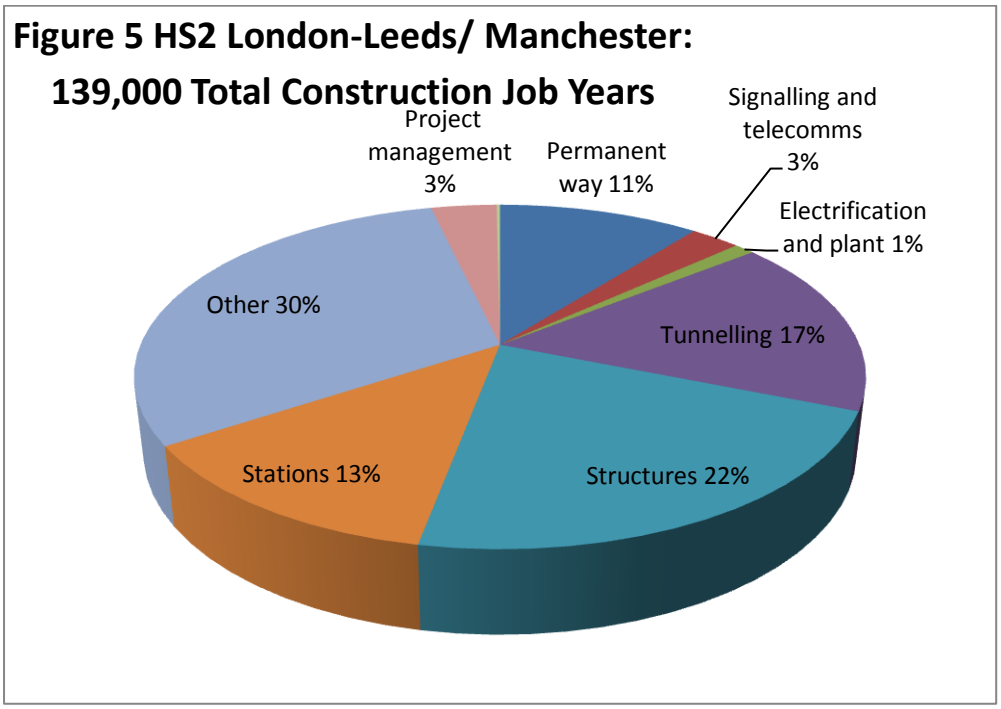
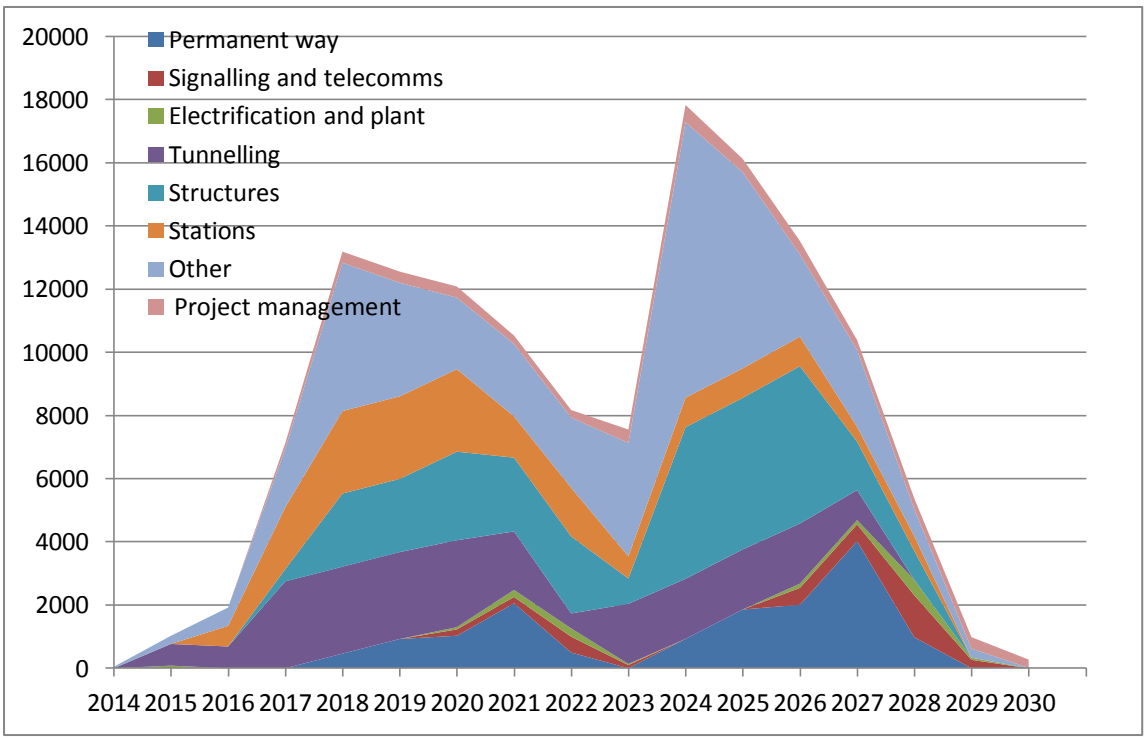


Figure 6 below shows the profile of construction jobs by work area, with the distinct peaks of activity for each of the two planned phases. This shows that the intensity of employment activity will be greater in Phase 2, matching the greater route distances involved. This is reflected in a more intense track laying (permanent way) profile in particular, along with a greater requirement for jobs in building structures rather than tunnels. This remains subject to further design development on the routes to Manchester and Leeds.

FIGURE 6: HS2 'Y' Network – Construction Job Profile



5 Photo courtesy of Bechtel Photo Library

Supply chain

Applying the same indirect jobs multiplier of 1.5 would lead to a further **70,000** job years in support of the direct construction contracts, for the full HS2 'Y' network.

Rolling Stock

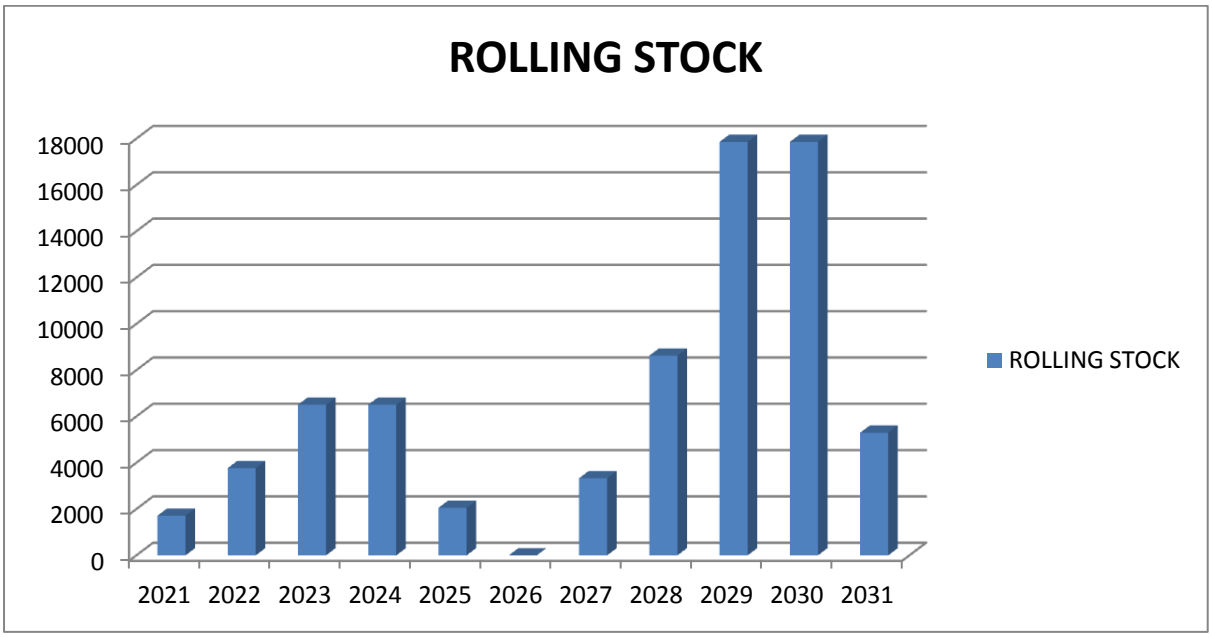
Employment

Total job years are estimated as **73,500** for the manufacture of a total of 171 trains, both designed exclusively for HS2 operation and for those additional units needed to operate the classic compatible services. The temporal profile of rolling stock jobs is set out in Figure 6. This highlights three key points:

- that the peak employment opportunities for jobs in building trains lie with the needs of the full 'Y' network, when up to **17,000 jobs** will be available by 2029;
- that decisions on rolling stock procurement for Phase 1 will have implications for these peak job opportunities;
- with programme assumptions adopted here, there would be a hiatus in train production budgets around 2026.

The significant supply-chain opportunities around rolling stock production suggest that a total of around **180,000 job years** would be associated with building trains to run on HS2.

FIGURE 6: HS2 'Y' Network – Rolling Stock Job Profile



Operations, Maintenance and Retail

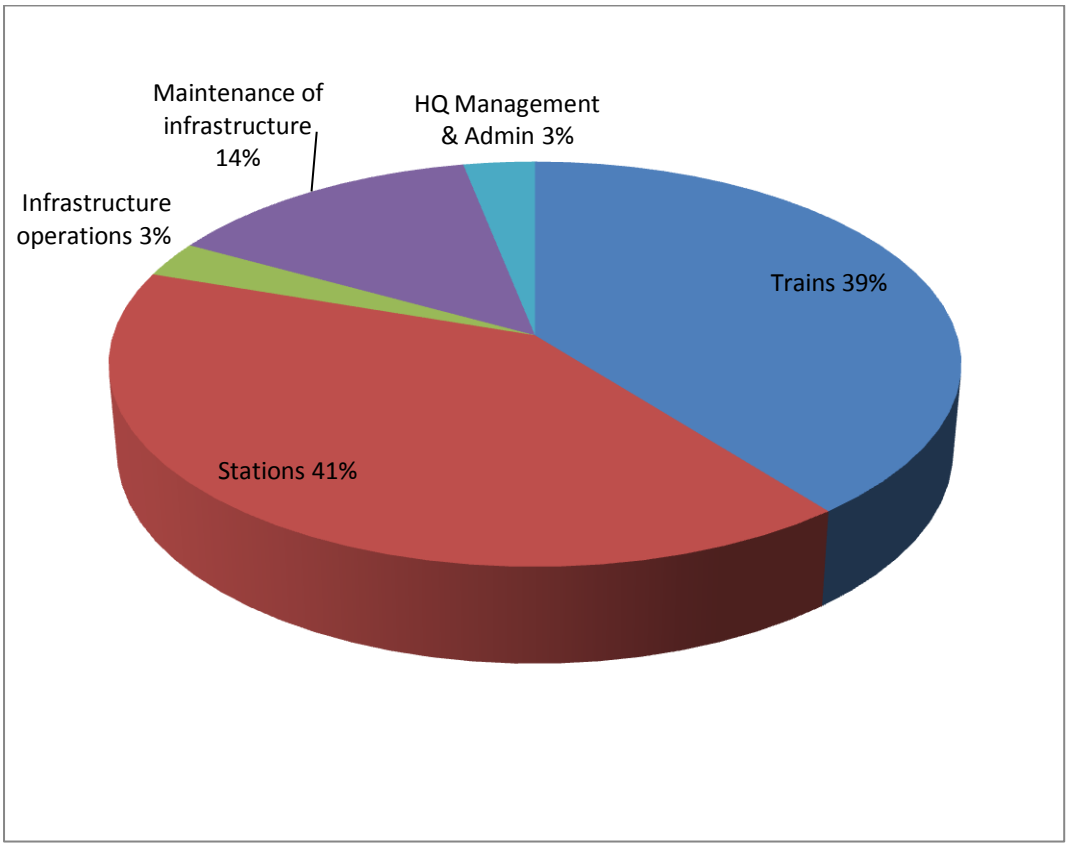
Employment

For the full 'Y' network, a total of almost **7,800** permanent jobs are projected in operations, maintenance and retail by 2032. This equates to over **345,000** job years across the 60 year project

life. Any uncertainty around these figures stems in part from the eventual station footprint sizes and therefore the extent of commercial activity (retail; catering) that will exist.

The breakdown of staff is shown in Figure 7 below. For the 'Y' network as a whole, jobs to maintain infrastructure and run the trains take on a bigger share of total permanent employment, reflecting the longer route network relative to station activity.

FIGURE 7: HS2 'Y' Network Permanent Operations, Maintenance and Retail Jobs



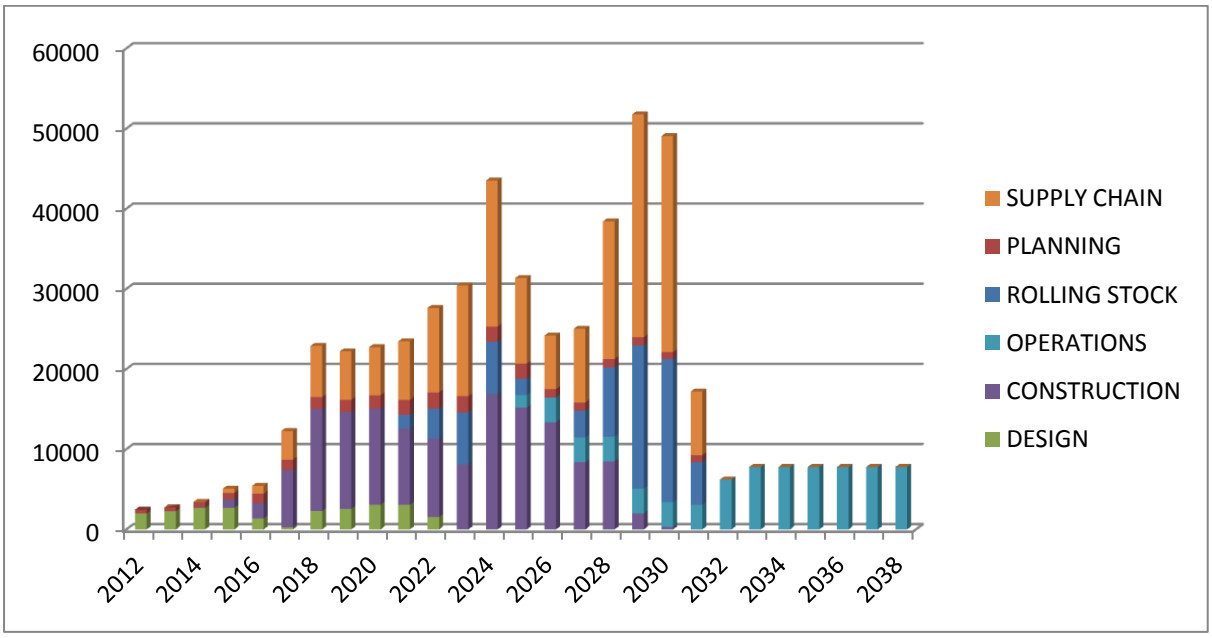
Renewals

Analysis of long-term renewals projects that almost **100,000** job years would be required across the 60 year period after scheme opening, across the whole HS2 'Y' network.

Summary

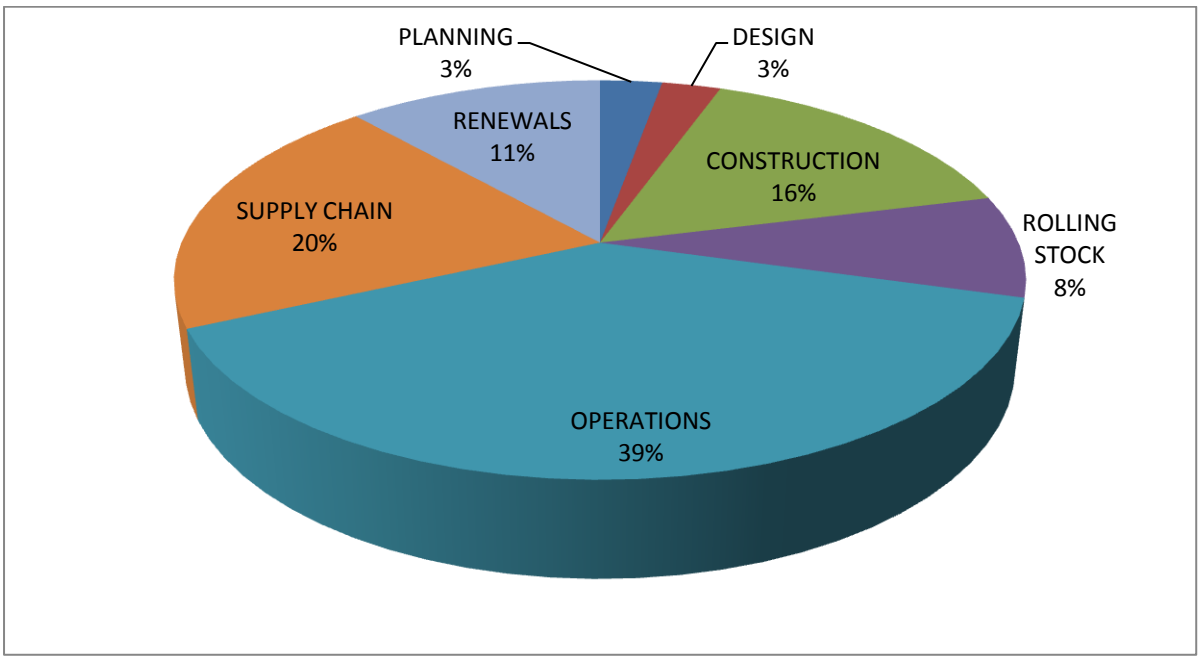
Total job years projected for the London-Leeds/Manchester HS2 project are almost **890,000** across the 60 year life of the project**.** Figure 8 below shows the expected profile of jobs across the construction and initial operation periods.

FIGURE 8: HS2 London – Leeds/Manchester - Jobs Profile



This demonstrates that job numbers will grow to around 20,000 by 2018 and continue, at least at that level, for the ensuing 13 years. Employment on the project is scheduled to peak in 2029 with more than 23,000 jobs. Figure 9 below shows how the whole project-life job years split by job area. This highlights that the permanent operations and maintenance jobs will form the largest job impact over time (39%) with construction, renewals and indirect (supply chain) jobs together taking 47%. Engineering jobs represent more than half of all jobs across the project life.

FIGURE 9 HS2 London – Leeds/Manchester - Job Years Disaggregation



Chapter 4 Commentary

Summary of Key Findings

Total job years projected for the London-Leeds/Manchester HS2 project are almost **890,000** across the 60 year life of the project**. On the standard assumption, that 10 job years equate to a full-time job, this is equivalent to creating 89,000 full-time jobs.**

Job numbers would grow **to more than 22,000 within 5 years**, representing a major economic boost to medium-term economic prospects. These jobs are in the design and engineering sectors and the supply-chain that supports them.

Subject to securing powers and funding for HS2 Phase 2, employment on the project could be maintained at at least 20,000 full time jobs pa across a 13 year period, and grow **up to a maximum of 50,000 jobs at any one time**. This certainty would encourage investment in skills training to provide the workforce needed to do the job.

The construction programmes for Phases 1 and 2 are designed to be complementary, but Phase 2 is more intensive and will require a larger skilled workforce, peaking in activity around 2024/25. This gives a clear lead time to develop skills policy initiatives to meet this peak. However, peak activity for tunnelling activity is much sooner and will occur in the next 5 years.

The majority of opportunities for construction jobs lie in civil engineering, with of the order of 80% of the construction jobs falling within this broad field. Specialist railway engineering jobs will nevertheless place additional pressure on scarce skilled resources in signalling and electrification engineering in particular.

Construction job years for the first Phase are projected to be 65,000, which compares with a figure of 56,000 quoted in the recently published Environmental Statement by advisors to HS2 Ltd. The analysis in this report has been produced independently and therefore provides a level of independent verification of the HS2 Ltd estimates.

Building trains for HS2 represents a major supply chain opportunity. The timing of procurement will be important to avoid order book discontinuity and production inefficiency.

HS2 represents a significant opportunity to boost economic growth and improve human capital in the UK: the Crossrail project in London has monitored its supplier base and found that more than 95 per cent of its budget awarded to date is being spent in the UK.

6 Photo courtesy of Bechtel Photo Library

Appendix A Evidence Base and Data Sources

- HS2 Ltd cost budgets and timing
  - March 2012 cost and design freeze
  - Train planning
- NSARE Forecasting the Skills Challenge
- Atkins
- HS1
- Bechtel
- Siemens
- Alstom
- Systra
- Carillion

Thanks are also due to Bechtel for providing access to their image database.