Economic Impact of HS2 on Chiltern District

Final Report

On behalf of **Chiltern District Council**

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Executive Summary

This study, commissioned by Chiltern District Council, provides an assessment of the range and extent of the socio-economic impacts that the construction and operation of HS2 is likely to have on the Chiltern district area.

The quality of natural environment and proximity to London make Chiltern district one of the UK's most popular visitor destinations. The AONB, which is the closest environmentally protected area to London and accessible by the London Underground, attracts approximately 55 million visits. This is equivalent to nearly every resident of England visiting once a year and significantly more than the British Museum, the most visited attraction in Britain (5.5m visits in 2012). It is also an attractive location for people looking to relocate from the city to live and/or start-up businesses. These key factors have helped to establish and maintain a strong and diverse economy, with particular strengths in recreation and tourism, and the knowledge based sectors.

HS2, as currently proposed, will pass through the middle of Chiltern district. A total of 2.5 miles of the proposed 11.3 mile section of line through Chiltern district will not be tunnelled. All of the exposed section of line will be within the Chilterns Area of Outstanding Natural Beauty (AONB). In the AONB as a whole, some 5.6 miles of line will be exposed. This AONB is the only nationally important environmentally protected area on the proposed route of HS2.

The destruction of such a large section of AONB would be unprecedented in the UK. Based on evidence, it is likely to create significant disruption and long term environmental damage to some of the natural assets for which the area was first awarded AONB status. Understanding the impact of the HS2 route on the Chilterns AONB should therefore be given high priority. This is because AONBs are areas considered by Natural England to have "significant national landscape value".

Approximately three quarters of Chiltern businesses surveyed consider that delays on the road network during the construction phase will negatively impact on movement of goods and services, staff and business trips. This will impact on business turnover, productivity and therefore employment. In the longer term, once HS2 is operational, 36% of businesses consider that their turnover will continue to be negatively affected, and consequently one in ten business owners are considering a change of location.

Based on estimates in this study of the likely social, economic and health & wellbeing impacts of constructing HS2, and the legacy of visual scars on the physical landscape and noise that will in some cases lead to blight of properties and businesses, and annoyance to others, generate a minimum total economic cost to Chiltern district alone of £170.4m by 2031. However, it has not been possible to estimate the full economic costs, and therefore this figure is a conservative assessment of the potential economic impact of the construction and operation of HS2 on Chiltern district.

Executive summary of estimated cost of HS2 to the Chiltern district by 2031

	Estimated costs at current present values (£m approximate)
Travel delay costs (for 8 year construction period)	£104.6
Road maintenance cost (for 8 year construction period)	£7.1
Amenity loss (present value over 60 years)	£6.0
Health and wellbeing impact (present value over 60 years)	£19.7
Productivity loss (present value over 60 years)	£2.6
Visitor spending loss (present value over 60 years)	£30.5
Total estimated cost to Chiltern district	**£170.4**

This monetarised estimate would be equivalent to about half the cost of tunnelling the whole route through remainder of the Chilterns AONB, from near Amersham to Wendover. With the inclusion of impacts on other Chilterns AONB areas outside of Chiltern district and allowances for the impacts which cannot be easily monetarised, it would be likely that the substantial costs on the Chilterns would outweigh the Government's cost of tunnelling through the whole of the Chilterns.

1 Introduction

1.1.1 HS2, as currently proposed, will pass through the middle of Chiltern district. A total of 2.5 miles of the proposed 11.3 mile section of line in Chiltern district will not be tunnelled. All of the exposed section of line will be in the Chilterns Area of Outstanding Natural Beauty (AONB). In total, 5.6 miles of line through the AONB, which extends beyond the district boundary, will not be tunnelled.

1.1.2 This study, commissioned by Chiltern District Council, provides an assessment of the range and extent of the socio-economic impacts that the construction and operation of HS2 could have on Chiltern district. As such, it presents a comprehensive assessment of location specific impacts covering the construction of the route through the district, including changes to and/or loss of its green infrastructure[1].

1.1.3 The latter impacts have largely been ignored in the socio-economic chapter of the HS2 Environmental Statement (2013), which focusses narrowly on the estimated route-wide construction jobs created and the employment effects of businesses that will be displaced. However, since this is a major infrastructure investment, particularly with new surface rail through the Chilterns, the narrow and somewhat simple approach fails to identify the "true economic"[2] consequence of the proposed HS2 route. The likelihood is that the current routing is going to have a major effect on Chiltern district, its environment and therefore the businesses and people located there, or visiting for recreational purposes.

1.1.4 The construction of the route is expected to start in 2017 and the first phase is likely to open at the end of 2026. The construction phase will result in the degradation of parts of the Chilterns AONB, and the permanent loss of some of the environmental and historic assets for which the designation was first awarded. It is projected to result in significant transport disruption which will, in turn, negatively impact on business performance; and it is expected that land take and severance will render some farm and tourism businesses unviable as on-going concerns.

1.1.5 When completed, HS2 will accommodate up to 14 trains per hour, running at speeds of up to 360 kilometres per hour. Since these trains will pass through Chiltern district without stopping, there will be little in the way of economic benefits to the district. Instead, there are major concerns that once the line is operational the damage to local amenity, tranquillity and visual scarring of the landscape will displace visitors from making day and staying trips. In addition, the permanent loss of green infrastructure could have significant impacts on house prices and residents' health and wellbeing, and business output.

1.1.6 The importance of understanding these impacts is identified in the Government's guidance (the HM Treasury Green Book) for appraising policies and investment decisions. The Green Book and its accompanying guidance on valuing environmental impacts, acknowledges the importance of understanding the environmental effects over the lifetime of the policy or project for comparing different options.

1.1.7 Understanding the impact of the HS2 route on the Chilterns AONB should therefore be given high priority. This is because AONBs are areas considered by Natural England to have *"significant national landscape value"*. There are only 34 such designated areas in England[3]

[1] We use this as a general term for green space offering formal and informal space for leisure and amenity enjoyment such as local and countryside access routes includes green transport cycle corridors, walking and horse riding routes. This space may include open unenclosed landscapes, agricultural land, and broadleaved and coniferous woodlands.

[2] This term reflects those values which can be priced by the market, such as the price for land, and those which have a wider value but have no market to put a price on this, such as the amenity value taken from green landscapes.

[3] Including one shared with Wales.

and the Chilterns AONB is the only one dissected by the proposed route of HS2. The main purpose of AONBs are to:

- *"Conserve and enhance the natural beauty of the landscape*
- *Meet the need for quiet enjoyment of the countryside*
- *Have regard for the interests of those who live and work there."*

1.1.8 Given the current lack of comprehensive consideration by the Government to the likely negative impacts on this area at this early stage of project development, it is therefore important to provide an indicative value to help shape the project, its proposed route and any mitigation. This report moves some way towards this, but it remains only a part estimate of true economic impact since it is not possible to measure all the likely impacts due to the difficulties in measuring and monetising them all.

1.1.9 In the rest of this study, the context for the Chiltern district economy, the performance of its businesses and the wellbeing of its residents are considered before identifying the range and, where possible, the economic value of potential impacts from the construction and legacy of the HS2 route through the Chilterns. This evidence should be central to decision-making, where choices need to be made between alternative route options based on informed judgments.

2 Study Context

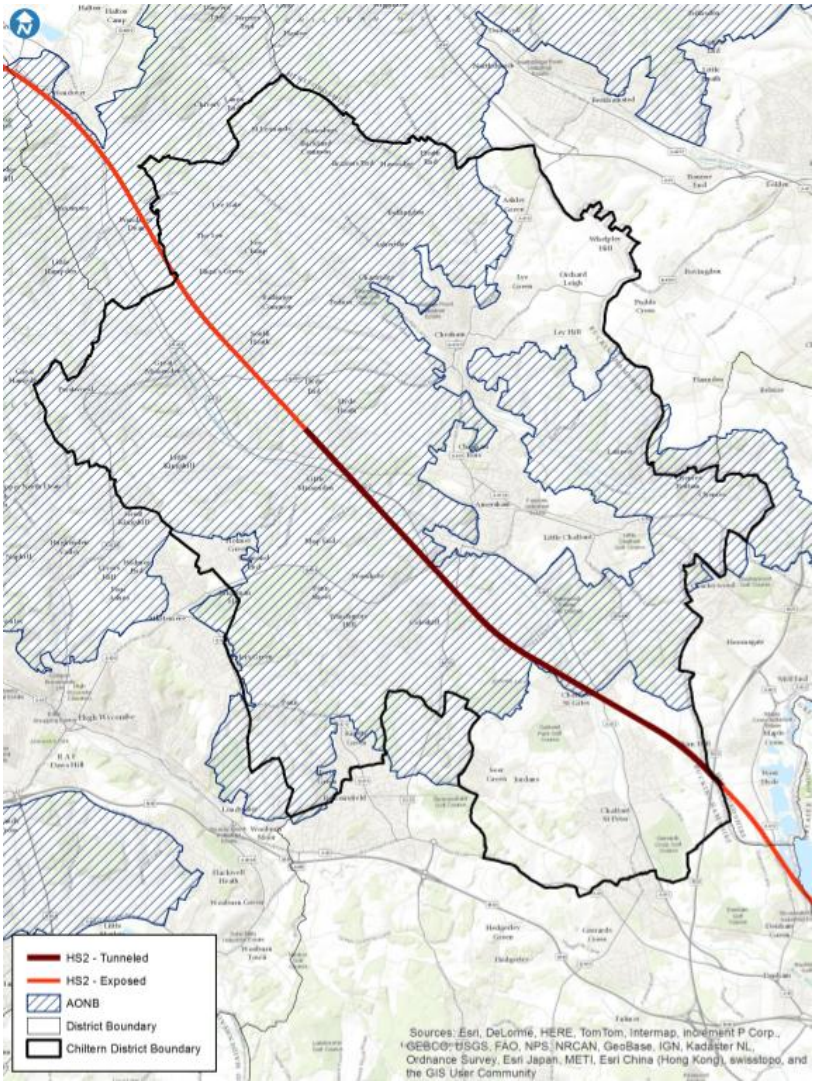
2.1 Introduction

2.1.1 This chapter sets out the context for the assessment. It begins by discussing the make-up and performance of the Chiltern district economy, highlighting the key qualities that set it apart from other areas along the proposed route of HS2. It then describes the proposed HS2 route through the area and the implications that this could have with regard to short and long term environmental damage.

2.2 Chiltern district today

2.2.1 Chiltern district is located in the Metropolitan Green Belt, some 15 to 20 km from the North West edge of London. It covers an area of approximately 196 square km (76 square miles), 72% of which is protected by AONB status and 88% is within the Green Belt. **Figure 2.1** shows the location of the AONB in relation to the proposed HS2 route.

Figure 2.1: Chiltern district map highlighting proposed HS2 route



Source: Based on GIS mapping

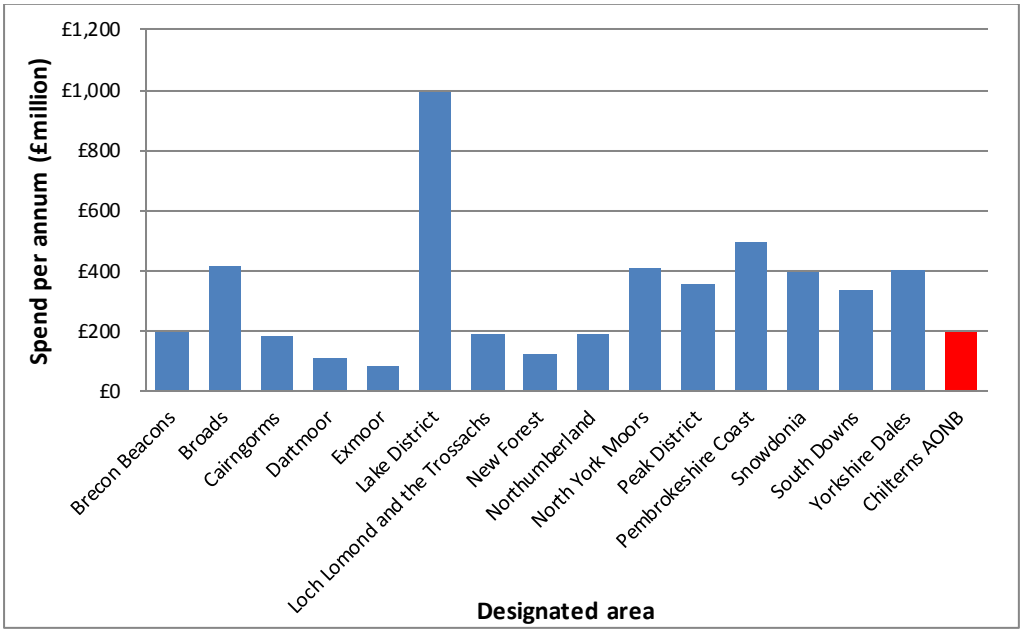
2.2.2 The district is home to some 93,250 residents[4], the majority of whom live in the historic centres of Amersham, Chesham, Chalfont St. Peter and Great Missenden. The attractiveness of the area, which boasts a high quality natural environment, good strategic transport links and good performing schools, is reflected in average house prices, which, at almost £500,000, are the highest for any rural authority in Britain. This reflects the quality of the area and the value that residents are willing to invest or accept in order to live there.

2.2.3 The Chilterns was awarded AONB status in 1965 to protect its special qualities which include the steep chalk escarpment with areas of flower-rich downland, woodlands, commons, tranquil valleys, a network of ancient routes, villages, chalk streams and an historic environment of hillforts and chalk figures. Within the AONB there are some 63 SSSIs[5], three National Nature Reserves, three European designated Special Areas of Conservation, 700 hectares of chalk grassland and 2,000 km of public rights of way[6].

2.2.4 The area's special environmental qualities, and its proximity to London and other major urban areas, help make the AONB a major draw for staying and day visitors. The AONB, which is the closest environmentally protected area to London and accessible by the London Underground, attracts approximately 55 million visits. This is equivalent to nearly every resident of England visiting once a year and significantly more than the British Museum, the most visited attraction in Britain (5.5m visits in 2012).

2.2.5 These visitors contribute an estimated £337 million of spend per year to the area, rising to £472 million when multiplier effects are factored in[7]. Of this total, some 9.3 million visits are from staying and day visitors from outside the AONB, who spend approximately £196 million. This level of annual visitor spend is greater than that recorded for a number of National Parks (see **Figure 2.2**).

Figure 2.2: Chilterns AONB visitor spend compared to National Parks



Source: Visitor spend from STEAM reports, mostly from around 2009. Visits from outside the area only.

[4] ONS Mid Year Estimates (2013).

[5] Site of Special Scientific Interest.

[6] Chilterns Conservation Board (2014) Chilterns AONB Management Plan 2014-2019 Consultation Draft

[7] Tourism South East (2008) Chilterns AONB Visitor Survey 2007/2008

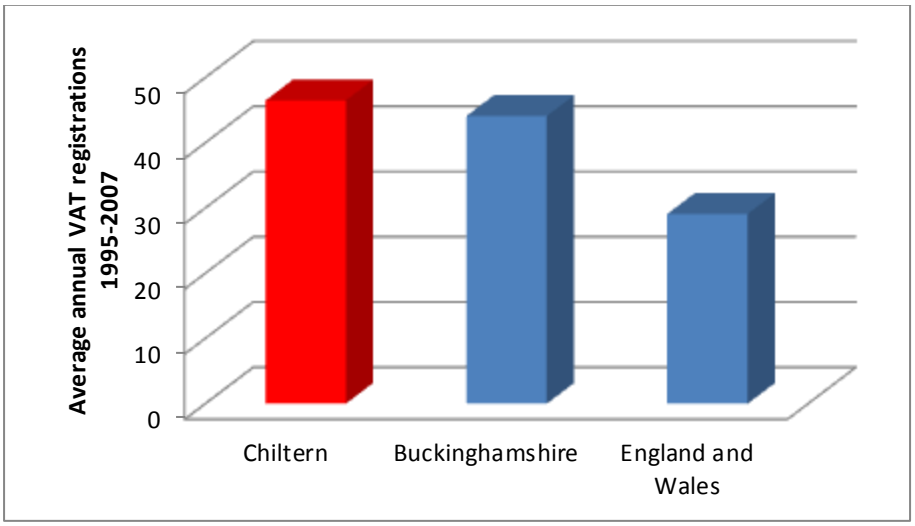
2.2.6 The main reasons given for visiting the AONB were for walking (43%) and 'sitting and relaxing/enjoying the views/picnicking' (24%). A further 11% of people surveyed stated that they were visiting a tourist attraction or place of interest.

2.2.7 As identified in an economic profile of the district economy in Appendix A, unlike a majority of Britain's environmentally designated areas, Chiltern district has a relatively large working age resident population (59% of the total), many of whom are very highly qualified. It is also very prosperous and has attracted a very high proportion of the knowledge based and high value Professional service and ICT sectors, as reflected in an average GVA per worker figure of £39,900, which is significantly higher than the UK average of £29,600[8], a high economic activity rate (79%) and a low unemployment level (1.5%), compared to 77% and 7.9% respectively across England and Wales[9].

2.2.8 The district's close proximity to London, combined with the high quality of life on offer and good transport links, have been key drivers in sustaining a strong high value local economy.

2.2.9 There are approximately 5,260 businesses in Chiltern district[10], employing more than 32,700 people. Of these, 93% are classified as micro-businesses, which is notably higher than the UK average (89%). This reflects the rurality of the district and the attractiveness of the area to those wishing to relocate and start-up new businesses. Indeed, as shown in **Figure 2.3**, between 1995 and 2007 VAT Registrations data shows that on average 46 new businesses start per 10,000 adults in Chiltern district per annum, compared to 29 across England and Wales. Whilst new enterprise is strongly supported by the current government, by their nature of being small in scale, and generally sole traders, smaller businesses are more vulnerable to small changes in circumstances, be it demand or supply changes, which result in business failures. This is an important consideration with regards to the construction of HS2 route in generating travel disturbances, and its legacy, with increased noise and land blight, which will impact on local supply and demand conditions, and therefore is likely to negatively impact on the emergence of new start-up businesses.

Figure 2.3: Average annual VAT registrations



Source: NOMIS. VAT Registrations. Published by the Department for Business, Enterprise and Regulatory Reform

[8] Annual Survey of Hours and Earnings 2013.

[9] Experian 2014 UK Local Market Forecasts Biennial – Total Output (GVA).

[10] ONS (2011) UK Business Counts - Enterprises

2.2.10 The attractiveness of the district area as a place to set up and do business is reflected in a survey of businesses in Chiltern district undertaken by Buckinghamshire Business First. In 2013 this survey showed that 75% of businesses are either satisfied or very satisfied by the area as a place to do business[11].

2.2.11 One of the main strengths Chiltern district's economy is its diversity, which has helped to protect it against global market fluctuations. Not only does the district maintain a strong representation in traditional sectors, like agriculture and tourism, but it has a well-established high technology business presence. Indeed, employment in the knowledge based sectors in Chiltern district accounts for 23% of total employee jobs, which is higher than nationally (21%).

2.2.12 Analysis of sector local representation based on employment using location quotients[12] in **Table 2.1** reveals that Chiltern district is very well represented in the 'manufacture of pharmaceuticals'. The majority of workers in this sector are employed by GE Healthcare, which is the largest private sector employer in the district. The other sectors that the district is particularly well represented in are 'programming and broadcasting activities', 'other professional, scientific and technical activities', 'scientific research and development' and 'activities of head offices; management consultancy services'. All of these sectors are in the knowledge based economy.

Table 2.1: Location Quotient – most represented employment sectors in Chiltern district

Sector	Location Quotient
Manufacture of pharmaceuticals	24.1
Programming and broadcasting activities	4.3
Other professional, scientific & technical activities	3.3
Scientific research and development	3.2
Activities of head offices; management consultancy services	2.5

Source: ONS Business Register and Employment Survey 2012

2.2.13 However, despite the economic diversity of the area, analysis shows that the construction sector, which employs 4.6% of the total population in Chiltern district[13], is relatively poorly represented compared to the national average. Furthermore, approximately 97% of the construction companies in the district employ less than 10 employees, compared to 93% across England and Wales. Consequently, there is a lack of capacity among local businesses to competitively tender for work on the HS2. It is also relevant that only 15 out of 650 registered jobseeker claimants were seeking construction related jobs in December 2013.

2.3 Looking ahead

2.3.1 Looking forward, Experian forecasts indicate that GVA[14] from the Recreation (+107%) and Accommodation and Food Services (+96%) will be important drivers for the district's economic

[11] BMG Research (2013) Buckinghamshire Business Survey 2013

[12] LQ is a sector's share of total employment in the study area divided by that sector's share of total employment in England. Sectors with an LQ below 1 are under-represented. An LQ of 1 indicates that a sector accounts for the same share of total employment in the study are as the national economy. An LQ greater than 1 indicates that the sectors are over- represented in the study area.

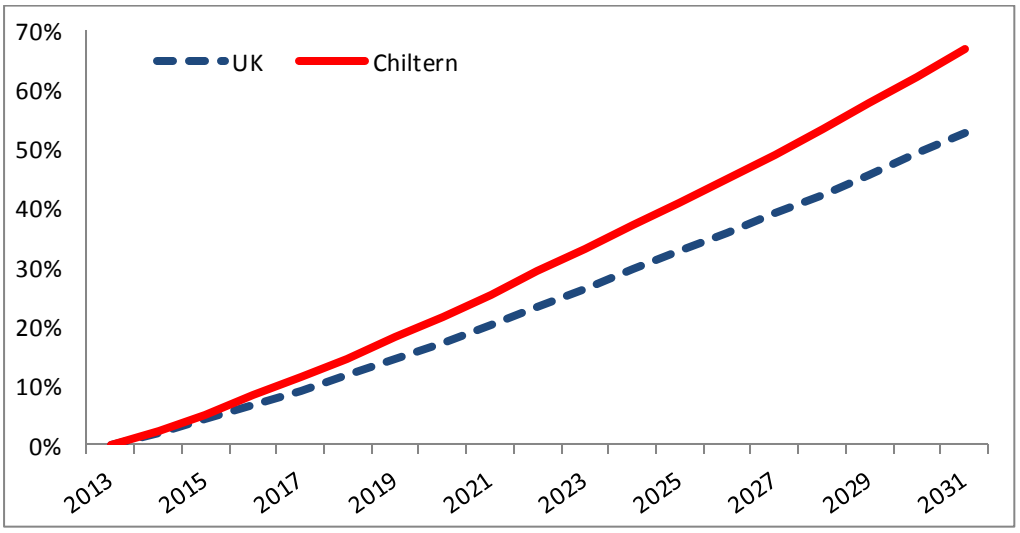
[13] Based on the Business Register and Employment Survey (BRES), which is the official source of employee and employment estimates by detailed geography and industry.

[14] Gross Value Added (GVA) is an economic measurement used to calculate the productivity of an economy.

growth. These sectors are likely to be heavily dependent on the quality of the local environment and accessibility to places of interest. This highlights how important recreation is to the local economy and that any undermining of the resource would have negative implications for long term economic growth in the area. Therefore the growth potential of Chiltern District is possibly overestimated should the proposed route of HS2 through the Chiltern go ahead, because this will reduce or detract from some of the local environment assets. This is shared by local businesses reaction to it, as discussed in the next chapter.

2.3.2 As shown in **Figure 2.4**, by 2031Chiltern district is expected to increase productivity by 66%, outstripping the national forecast growth of 50% over this period.

Figure 2.4: Forecast GVA Growth to 2031 (note that this does not take into account the construction and operation of HS2)



Source: Experian Economics, Spring 2014

2.3.3 It should be noted that Experian forecasts are driven by demand and do not factor in supply side issues, which includes the proposed HS2 route through the district, which is looked at next.

The proposed HS2 route through Chiltern district

2.3.4 The Government's investment in the HS2 route has been identified by the Department for Transport *as "the most significant transport infrastructure project in the UK since the motorways were built in the 1950s and 1960s."* Consequently, the impact of new rails through the Chiltern district, as currently proposed, is likely to be the biggest supply side change that the district economy has experienced in modern times.

2.3.5 The first phase of HS2 will stretch for approximately 140 miles from London (Euston Station) through the Chilterns, Warwickshire to Birmingham International, South Northamptonshire and Central Birmingham (Curzon Street Station). The likely width corridor will be 75m[15], allowing for 2 lines, a parallel service road and a 25m buffer zone on either side.

2.3.6 The proposed HS2 route will run through 20.8km (12.9 miles) of the Chilterns AONB, of which 9km (5.6 miles) will not be tunnelled. Within Chiltern district, the line will stretch for 18.1km (11.3 miles), of which 4km (2.5 miles), all of which is in the AONB, will not be tunnelled.

[15] This is broadly equivalent to the width of a standard football pitch.

2.3.7 The proposed tunnel will pass under Chalfont St.Giles and to the south of Amersham, before emerging in woodland to the east of the A413 and west of Hyde Heath. It continues to the east of the A413, mostly in cutting before crossing over the A413 at the south end of the Wendover by-pass and then running generally at ground levels to the west of Aylesbury. The extent of the above ground construction is highlighted by **Figure 2.1** (page 3), which shows both the proposed HS2 route, as well as an alternative route that extends the tunnel through the Chilterns AONB.

2.3.8 The major construction elements within Chiltern district are:

- Chiltern Tunnel – covering a distance of over 9.6km between Chalfont St.Peter and Hyde Heath. Within the AONB, the Chiltern Tunnel will be served by vent shafts proposed at Chalfont St.Giles, Amersham and Little Missenden. Auto-transformer stations will be located adjacent to vent shafts at Chalfont St. Giles and Little Missenden;
- Chiltern Tunnel north cutting (1.4km);
- South Heath green tunnel (1.2km); and
- South Heath cutting (3.1km) including the adjacent Hunt's Green Farm sustainable placement area, for the permanent storage of approximately 1,000,000m^3 of surplus excavated material approximately 5m high[16], 1.3km long and up to 450m wide.

2.3.9 During construction there will be significant lorry and construction personnel movements through the district, particularly between the main construction compounds, to the South of the M25 and at South Dean (near Wendover), and the HS2 route. There will also be satellite construction compounds along the HS2 route, although the exact locations of these have not been specified yet.

Range of impacts

Visitor economy

2.3.10 The Chilterns AONB was designated for the natural beauty of its landscape, and its natural and cultural heritage. In total, PBA analysis using GIS mapping shows that 203.3 hectares of AONB will be lost as a result of constructing the preferred HS2 proposal.

2.3.11 Within this area some 1,603m of Public rights of way (PRoW) will be affected by the proposed route of HS2, whilst a further 1,336m of cycle way will be temporarily or permanently lost[17]. This potential damage to such important green infrastructure assets is significant because the maintenance of a fully integrated network is essential for protecting opportunities for the public to both safely enjoy the countryside for recreation and health; and for non-vehicular access to services and between communities.

2.3.12 In addition, an estimated 4.8km of Ancient Track Way and 8.2 hectares of Ancient Woodland will be lost[18]. All of these assets are key components of the area's visitor economy that are expected to be lost forever.

2.3.13 Representatives of the tourism sector are most concerned about the long term damage that will be caused to Chiltern's image. It is expected that road delays during the construction period, temporary and/or permanent closures of PRoWs and cycle routes that will impact on the network as a whole, visual scarring of the landscape and the undermining of tranquillity

[16] Note that the tenants of Hunts Green Farm have been told that the spoil could actually be up to 9 metres high.

[17] Estimated by PBA using GIS mapping

[18] Estimated by PBA using GIS mapping

could deter people from visiting. Furthermore, those that do visit during the construction period, and have a bad experience, can be expected not to return.[19]

Agriculture

2.3.14 The Environmental Statement for HS2 lists a total of 27 farm holdings in the Chalfonts and Amersham and Central Chilterns areas that will be affected by the construction and operation of HS2. A total of 197.4 hectares of land on these farms will be put out of production during the construction of HS2. It should be noted that 15 of the farm holdings affected will have more than 25% of their land area taken. This will have significant consequences for the ongoing viability of these farms.

2.3.15 Following the completion of the construction of HS2 restoration works will be carried out to allow 91.7 hectares to return to agricultural use. Therefore, 105.7 hectares of agricultural land and 15.9 hectares of forestry will be permanently taken out of production.

2.3.16 As well as being concerned about loss of agricultural land, the NFU in consultation with Buckinghamshire County Council, have expressed concern, on behalf of their members, regarding the severance of farm tracks by HS2. The severance of accommodation crossings which become inefficient for farms to share, will add to production costs, affecting already narrow profit margins. Many farmers are also concerned that construction will permanently damage field drainage and make land that is only identified as being temporarily lost unworkable in the long term. The stony nature of Chiltern district soil means that farmers' have taken many years to prepare their land so that it is easily ploughed and seeded and the dumping of spoil would set this process back considerably.

Spoil dumping

2.3.17 The Environmental Statements for the Chalfonts and Central Chiltern Area indicate that more than 11.1 million tonnes of spoil will be generated by HS2 construction works in the Chiltern district area. Only 22,212 tonnes of this will be taken out of the district for landfill. The remainder will be either built into the embankments or transported by lorry to sites nearby.

2.3.18 In addition, to the 1 million or more tonnes that will be dumped at Hunts Green Farm, HS2 Ltd estimate[20] that more than 280,000 tonnes of spoil will be dumped within 2 to 3 miles of the tunnel portal at Mantles Wood near Amersham. This alone could result in an estimated 56,666 truck movements along local roads during the construction phase.

Transport disruption

2.3.19 The construction of the proposed scheme is bound to result in changes in daily traffic flows due to works and construction vehicles accessing worksites and also temporary road closures and diversions. Given the restricted, often single lane highways, and busy road network through Chiltern district, even a small disturbance is likely to have significant impact on delays. Paragraph 12.4.5 of the HS2 Environmental Statement CFA 9 report for the Central Chilterns highlights that the core construction operating hours will be 08:00 to 18:00 on weekdays and 08:00 to 13:00 on Saturdays. Each of the Community Forum Area (CFA) reports within the Environmental Statement for Phase 1 of HS2 identifies the strategic and local roads where significant increases in peak-time traffic flows are expected (i.e. more than 30% increase for HGVs or all vehicles). The tables in the CFA report highlight significant increases in traffic on strategic and local roads in Chiltern district.

[19] A case study of the Roald Dahl Museum in the next chapter considers this point in more detail.

[20] Neil Cowie, HS2 Ltd Country South Area Manager, addressing the Community Forum in Little Kingshill.

2.3.20 During the construction phase there will also be a number of roads within the local network that will be closed during the proposed highway works. These include:

- Hyde Lane – temporary road closure and traffic diversion, to allow construction of overbridge;
- Frith Hill – temporary road closure and traffic diversion, to allow construction of realigned road; and
- Bottom House Farm Lane – temporary road closure and traffic diversion of motorised users, with access only for residents and diversion for all other traffic, to allow widening of Bottom House Farm Lane.

2.3.21 All of these impacts will result in delays and increased travel times for business employees and customers throughout the construction period. Oxford Economics estimate that the economic costs of increased Annual Average Daily Traffic (AADTs) on the routes identified in the Environmental Statement will be approximately £18.1 million in increased travel costs per year due to delays and £25.6 million due to increased traffic for an indicative year across Buckinghamshire[21]. These estimates have been made by applying QUADRO manual typical user delay costs for "S2 shuttle working, Max-Q Delay 5 min" values for one way AADTs of 5,000, 8,000 and 10,000,where relevant, to eleven selected points within Buckinghamshire, in the area where the proposed HS2 alignment would appear to intersect with local roads. In addition to this, Oxford Economics estimate that bus journey times will increase by 22%, resulting in an 11% drop in demand or a loss of 416,304 trips (the equivalent of £404,000 in lost revenue).

2.3.22 Not only will these delays impact on business performance but they could impact on resident health and wellbeing. Amersham Hospital currently deals with approximately 50,000 outpatient visits per annum, whilst accident and emergency cases are handled by Stoke Mandeville Hospital, which is located outside the district, approximately 19km from Amersham. Delays to cross district travel times to Amersham Hospital will negatively impact on resident health, whilst delays to ambulance trips to Stoke Mandeville Hospital could even put lives at risk. It should be noted that the South Central Ambulance Service have recently stated that 'delivering emergency services across Buckinghamshire is a challenge with increasing demand, significant rurality and the changing configuration of hospital services'[22]. Chiltern district is not an exception to this, as long delays are already experienced during peak periods at key junctions along the A355 and A413 in particular.

2.4 Summary

2.4.1 The high quality natural environment and proximity to London have helped to establish Chiltern district as one of the UK's most popular visitor destinations, as well as an attractive location for people looking to relocate from the city to live and/or start-up businesses. These key factors have helped to establish and maintain a strong and diverse economy that outstrips national GVA performance. Furthermore, GVA forecasts, which do not factor in the impact of HS2, indicate that this strong economic performance will continue, driven by recreation activities in particular. This economic sector, after agriculture, is probably likely to benefit the most from the quality of a local environment.

2.4.2 The proposed route of HS2 will be through the middle of Chiltern district, including a section through the AONB that will not be tunnelled. The AONB is the only nationally important environmentally protected area on the proposed route of HS2. The destruction of such a large section of AONB or National Park would be unprecedented in the UK. It will result in significant

[21] Oxford Economics (2013) Construction Impacts of HS2 in Buckinghamshire

[22] Chesham Town Council Response to the HS2 Environmental Statement consultation.

disruption and long term environmental damage to some of the natural assets for which the area was first awarded AONB status. The importance of these natural assets, and their clear linkage with the district's high economic performance, should not be underestimated. Table 2.2 summarises these environmental losses.

Table 2.2: Estimated losses of environmental assets in Chiltern district as a result of HS2

Environmental asset	Total loss as a result of HS2
Area of Outstanding Natural Beauty	203.3 hectares
Public Rights of Way	1,603 metres
Cycle Way	1,336 metres
Ancient Track Way	4.8 kilometres
Ancient Woodland	8.2 hectares
Agricultural land temporarily lost	197.4 hectares
Agricultural land permanently lost	105.7 hectares

Source: Based on GIS mapping

3 HS2's Impact on Chiltern Businesses

3.1 Introduction

3.1.1 More than 50 Chiltern district businesses were consulted during the course of the study, both in the form of a business survey and detailed interviews. The aim of the consultations was to capture opinions about the construction and operational phases of HS2, and the implications that this could have for business performance.

3.1.2 This section summarises the feedback obtained from the business survey before focussing on three case studies covering a large business, a visitor attraction and a farm. These in depth business case studies broadly reflect the unique types of businesses in the Chiltern district, and in one form or another, all three types are estimated to be substantially impacted by the investment in the HS2 route. The views expressed by the case study businesses are consistent with those of many other businesses surveyed in the district.

3.2 General business opinion

3.2.1 On March 12th 2014 a questionnaire was hand delivered to more than 150 businesses located within 2km of the exposed section of HS2 within Chiltern district. This 2km buffer, which is considered by commercial agents and estate agents to be the most likely negatively affected area, includes the settlements of Old Amersham, Great Missenden, Prestwood, Hyde Heath and South Heath.

3.2.2 The questionnaire (see Appendix 2) contains detailed questions on current business operations and performance. It also includes a range of questions aimed at collecting views on how the construction and operation of HS2 might impact on their business. A total of 55 businesses completed their questionnaires, representing a response rate of 35%. This is a high response rate given the limited timeframe for the survey. The businesses taking part were largely small, but representative of the economy as a whole. Those taking part largely fell within retail and business services sectors, many of which are dependent on visitor spend.

3.2.3 The surveyed businesses employed an average of 5 people, with the largest employing 24 staff. 54% of staff work on a part time basis, which is significantly greater than the proportions of part time workers recorded across Chiltern district (35%) and is reflective of the high proportion of retail and tourism related businesses that operate in the 2km buffer of the planned surface section of HS2.

3.2.4 Of the total number of staff employed by the business respondents, 82% live in Chiltern district itself and 75% travel to work by car. This level of car reliance is significantly higher than those recorded for Chiltern district (57%) and England and Wales (54%)[23] and reflects the rurality of the area surveyed.

3.2.5 The most popular reasons given for locating businesses in Chiltern district were given as 'desire to be in this specific area' and 'pleasant environment/attractive area'. More than half (56%) of the respondents stated that the close proximity of the AONB has a major positive effect on business performance, whilst just 40% think it has no impact. The large majority of those that think it has a positive impact consider that the quality of the natural environment is crucial for attracting wealthy residents and visitors to the area, which in turn benefits their business. A further 39% think that the quality of the natural environment is a very important or important factor in the recruitment of staff. Linked to this, 55% of respondents consider that the proximity of the business to the AONB has either a major or minor positive impact on staff productivity.

[23] Census 2011

3.2.6 Selected comments from respondents include:

- *"People live here because of the beauty of the area";*
- *"Our work is creative and we often take walks or sit outside to discuss problems or think through issues. This is a key part of our business offering as we solve problems and create solutions that our customers are either not able to or do not have resources to do"* and
- *"We gain improved staff morale from working in pleasant surroundings. The area attracts visitors to the shop which keeps staff busy and motivated"*.

3.2.7 Most respondents are concerned about the impact of the construction phase of HS2 on their business operation and performance. 77% of businesses consider that delays on the road network will negatively impact on the movement of goods and services, staff travel and business trips. Furthermore, two thirds of businesses think that the construction phase will have a major negative impact on their turnover, with the majority considering that this could represent between a 20% and 50% annual loss over the 7 years. Linked to this anticipated reduction of turnover, 40% of respondents think that this could potentially result in the loss of staff members.

3.2.8 Selected comments from respondents include:

- *"Clients and staff travel will be disrupted every day";*
- *"Traffic will be terrible when delivering orders"*
- *"Local roads network will be substantially impacted delaying staff movement to our projects";*
- *"No one will come near Missenden due to work";*
- *"Stock being delivered would be held up – this would affect our turnover because we won't be able to sell stock";* and
- *"Any additional travelling time and delays will be costly in terms of lost time and additional mileage claims for diversions. Delays in deliveries will cause problems with customer expectations as we offer a quick and responsive service".*

3.2.9 Once construction has finished and HS2 is operational, 36% of respondents think that their business turnover will be negatively impacted, ranging from about 10% to 50% loss in turnover, whilst 30% consider that it will make no difference. Looking forward, 43% of respondents think that business growth aspirations will be damaged in the longer term, 38% think that footfall will fall, and 37% consider that they will experience a reduction in the market areas that they currently serve. As a result of these impacts, 10% of businesses interviewed are considering a likely change in their location in the short to longer term.

3.2.10 When asked how the potential impact of HS2 on their business operations and performance could be mitigated, the majority of respondents either said that HS2 should be abandoned or tunnelled through the whole of the Chilterns AONB.

3.2.11 Selected comments from respondents include:

- *"The only action which would reduce the impact of the construction and operation of HS2 on the Chiltern economy is not to build it";*
- *"Tunnel through the Chilterns, which exits after Wendover";*

- *"HS2 traffic should not use public roads. All roads should be kept open";*
- *"When it goes ahead, we will never be able to regain our beautiful village high street – stop HS2";* and
- *"A tunnel all the way under the Chilterns; b. move any spoil away from the villages by main roads and avoid country lanes and road closures".*

3.3 Case study 1 - The Entertainer

3.3.1 The Entertainer was established in 1981 by Gary and Catherine Grant when they opened their first toy shop in Amersham. Today it is the UKs largest independent toy retailer. The business boasts a network of 90 toy shops and has a strong internet presence. In total it employs approximately 1,100 staff.

3.3.2 Within Chiltern district, The Entertainer operates from a 60,000 sq.ft. office and warehouse headquarters in Little Chalfont, whilst also still running its original toy shop in Amersham. Approximately 90 staff are employed at the headquarters, including management, finance, administration, IT, sales and warehouse personnel. These employees either work on a full time basis or do more than 20 hours a week on flexible shift patterns, with average wages of approximately £30,000 per annum. Approximately 100 additional agency workers are taken on over the Christmas period to help meet increased demand for online sales, most of whom are bussed in from Slough.

Source: The Entertainer

3.3.3 The company does not have difficulty filling vacant positions as and when they arise. The high quality of life on offer in the Chilterns, linked to the natural environment in particular, is attractive to those seeking management and finance positions. Approximately 75% of all staff live in the district, whilst warehouse staff generally travel in from places like Slough and Aylesbury on a daily basis.

3.3.4 The quality of the transport network is essential for business operations. Staff have to be in the office by 8am in order to meet inquiries from the network of shops, which open to the public at 9am. Any hold up on the road network of deliveries to and from the premises could have major repercussions for business. The headquarters receives approximately 20 vehicular movements per day, of which 6 (3 in/3 out) are HGVs. These rise to more than 50 movements a day at peak times, including 20 HGVs.

3.3.5 The headquarters handles parcels with a retail value of £18m per annum, all of which are linked to internet sales. Approximately 12% of all parcels handled by The Entertainer arrive at the headquarters from Southampton (Chinese imports, Flare, Bandi and Lego/Playmobil), Daventry (Mattel and Vivid), Oxford (Vitec) and Newport (Hasbro). A further 8% of all parcels are delivered to the headquarters from the main distribution hub for The Entertainer, which is located in Swindon (which handles 88% of all parcels). Once received at the warehouse, parcels are sorted and sent out by courier to their main distribution hubs as and when internet purchases are made. The company relies on its ability to meet 'just in time' deliveries to maintain its market position and reputation.

3.3.6 The headquarters costs approximately £9m to run per annum. This covers salaries and premises costs associated with running the business, as well as costs associated with transport, packaging and labour associated with internet sales.

3.3.7 The construction impacts of HS2 are a major concern for The Entertainer. Increased lorry movements and delays on the strategic road network will impact on supplies coming in and dispatches. If the company fails to meet it's just in time delivery targets it could seriously undermine performance and the company's client base. They are also concerned about the impact of the construction phase on the customer base of their shop in Amersham. For example, should loyal customers alter their shopping habits it may take many years to attract them back. In the longer term, they are worried that they could lose valuable members of staff, particularly those working in the warehouse, many of whom live outside the district and already experience high travel costs.

3.3.8 In terms of costs, The Entertainer estimate that the sales performance of the Amersham shop could fall by 5% per annum, equating to a loss of £100,000 over 10 years. In addition, they could lose up to 10% of staff, who become frustrated with increased travel times and costs. Based on the cost of recruitment, this could cost the business £50,000. These costs, combined with other costs linked to lost business, could amount to £250,000 or more overall.

3.4 Case study 2 - The Roald Dahl Museum

3.4.1 The Roald Dahl Museum and Story Telling Centre was established in Great Missenden in 2005 to house Roald Dahl's archive, to celebrate the life and works of the author and to inspire children to read. Roald Dahl lived in the village for 36 years, during his most prolific period of writing. The inspiration for his work is drawn from the natural and physical qualities of the area, much of which is referenced in his work.

3.4.2 The Museum is based in a converted 16th Century coaching inn loft in the village centre. The Museum itself comprises two biographical galleries which tell the story of Roald Dahl's life and work. It also displays Roald Dahl's archive of manuscripts, letters and photographs, which is one of the most complete literary archives of the twentieth century. The Museum also runs an education programme which has helped to establish it as a destination venue for school groups from all over the UK. Coupled with the Museum, there are popular village and countryside trails which take in key locations and reference points in Roald Dahl's life and literature.

3.4.3 The Museum has won multiple awards since it opened, including being awarded Enjoy England's and Tourism South East's Best Small Visitor Attraction. It has also been highly commended in the European Museum of the Year Award and holds a Gold Green Tourism Award from the Green Tourism Business Scheme.

3.4.4 The Roald Dahl Museum and Story Centre is a charitable company, limited by guarantee. The shop and special events not directly related to the charity's objectives are run through the Roald Dahl Centre (Trading) Ltd. Café Twit is run by an external contractor. The shop suppliers currently deliver to the Museum on an ad hoc basis, although the ecommerce arm of the Trading Company has moved to a central distribution company based in Hove.

Source: Roald Dahl Museum

3.4.5 The Museum has received more than 500,000 visitors since it opened, and is on target to receive 68,000 visitors this year. This makes it the most visited tourist attraction in the Chilterns AONB by some distance[24]. Ticket sales alone generate approximately £300,000 per annum for the charity, whilst wider spend by visitors benefits Great Missenden town centre and the Chiltern district economy as a whole.

3.4.6 Visitors are split roughly between 60,000 family and 10,000 school visits. Approximately 20% of visits are repeat visits. The majority of visitors come from a 90 minute drive time catchment. The Museum also provides outreach services to schools in the catchment.

3.4.7 The Museum has 50 members of staff on its payroll, including a large pool of front of house staff. In total, this equates to approximately 14 full time employee equivalents. These staff travel to work from as far afield as Oxford, London, Thame, Leatherhead and Tring.

3.4.8 The manager of the Museum has plans to grow visitor numbers to 100,000 within 5 years. However, the Museum is at capacity in peak times so they have commissioned a space planning consultant to establish how they can expand within their existing premises.

3.4.9 The impact of HS2 has not yet been built into the future growth planning of the Museum. The construction phase of HS2 is a major concern. The managers consider that if the area is perceived to be a building site through media coverage and word of mouth then people will decide against visiting. This is particularly the case for families, who will be keen to avoid long journeys with children in the back of their cars. They are also concerned that those who do visit will be deterred from coming again because the noise and scarring of the landscape will be unpleasant, particularly when they are walking the village and country trails.

3.4.10 Although the managers cannot estimate how much of an impact this will have they are likely to review their growth aspirations downwards.

3.5 Case study 3 - Hunts Green Farm

3.5.1 Hunts Green Farm, located above the Misbourne Valley and within the AONB, has been in the same family for four generations. It is currently rented from the Stewart Liberty Family Trust by Robert Brown. The farm comprises 250 acres, which are farmed by Robert, who is assisted by his dad and a part time contractor.

[24] Visit England (2012) Annual Survey of Visits to Visitor Attractions 2012

3.5.2 Robert splits his farm between arable (88 acres) and hay/grazing (90 acres). The remainder is woodland. He sells the wheat and barley to grain agents who sell it on for bread making. The hay is baled up and sold to horse owners.

3.5.3 The annual turnover of the farm is approximately £250,000. Robert aims to achieve a yield of three tonnes of barley or wheat per acre. This is sold for approximately £135 per ton, although this varies depending on the growing conditions and its impact on the quality of grain. The other fields yield approximately two tonnes of hay per acre, the equivalent of 180 tonnes. Each bale is sold for between £4 and £5.

3.5.4 Seed and diesel suppliers visit the farm on a daily basis and Robert has to make multiple daily road trips to deliver hay to customers, who are largely based within a 15 mile radius of the farm.

3.5.5 The proposed route of HS2 runs directly through the middle of Hunts Green Farm. It is proposed that it will dissect the best sections of arable land on the farm. The remainder of the land above the proposed rail line will be used to dump 1.93 million tonnes of spoil.

3.5.6 This will leave Robert with approximately 70 acres of land above the rail line and sections of land below the line. In reality, however, the remaining sections of land below the rail line will be severed from the farmstead. Furthermore, as the remaining land will largely comprise irregular shaped and sloping fields, it will not be feasible to farm it for arable crops.

3.5.7 Robert has been told that the permanent land loss will only be that associated with the rail line itself. However, in reality, the fields that will be used for the dumping of spoil will also be lost to agricultural use permanently. He has been told that sections of the levelled fields will be 9 metres above their current level and will therefore be difficult to access. Furthermore, the nature of spoil is that it is poorly drained and infertile.

3.5.8 Although Robert has been reassured that the stages of construction on his land will be phased and that bridges will be constructed to allow him access to sections of land, he is struggling to see how he can continue his business. His best land will be taken, and remaining sections will be severed or left infertile and poorly drained. Although he will be compensated for some of the loss, it does not make up for his potential loss of livelihood and family home.

3.6 Summary

3.6.1 The quality of the natural environment is a key consideration for businesses looking to establish in, or relocate to, Chiltern district. It is also very important for attracting visitors and their spending, which is essential for sustaining many local businesses.

3.6.2 It is clear that the district business community is very concerned about the short and longer term impacts of HS2, as is evidenced by the business survey results summarised in **Table 3.1**. Transport disruption during the construction period is perhaps their main concern; with businesses fearing the effect that declining footfall could have on their turnover and even their ability to continue operating. In the longer term, those businesses that are particularly reliant on tourism are concerned that the undermining of the AONBs environmental assets will result in a continued loss of trade. Consequently, 10% of businesses interviewed were considering changing location. Most importantly, none of the businesses interviewed consider that the construction and operation of HS2 through Chiltern district will have any positive benefits to their operations or performance in the short to longer term.

3.6.3 The case studies detailed in this chapter set out a range of concerns that have also been expressed through the business survey. The Entertainer are particularly concerned about the impact of traffic delays on their distribution activities and ability to retain key staff. The managers of the Roald Dahl Museum are concerned that potential visitors will avoid the area during the construction period of HS2, and those that do visit will have such an unpleasant experience due to delays, noise and visual impact that they may not return. The tenants of Hunts Green Farm, which will not only be severed by HS2 but will also be used for the dumping of spoil, are unlikely to be able to maintain a viable operation during the construction phase and are concerned that they will be unable to re-use their 'temporarily lost' land in the future.

Table 3.1: Chiltern district business survey summary results

% of respondents	Highlighted Chiltern business responses
Chiltern district today	
75%	Of staff travel to work by car
56%	Consider that close proximity to the AONB has a major positive effect on business performance
39%	Consider that the quality of environment is an important factor in the recruitment of staff
56%	Of businesses consider that proximity to the AONB has a major positive effect on staff productivity
During HS2 construction/operation	
77%	Consider that delays on the road network during the construction of HS2 will negatively impact on movement of goods and services, staff and business trips
66%	Of businesses consider that the construction phase of HS2 will negatively impact on their turnover
40%	Of businesses consider that they could lose staff members as a result
36%	Consider that their turnover will be negatively affected when HS2 is operational
43%	Consider that their business growth aspirations will be damaged in the longer term
38%	Think that footfall will be reduced in the longer term once HS2 is operational
37%	Think that they will experience a reduction in the market areas they serve
10%	Of businesses are considering a likely change in their location in the short to longer term
0%	Of businesses think that HS2 will positively impact on their operations

4 HS2's Traffic Impacts in Chiltern District

4.1 Introduction

4.1.1 The rurality of Chiltern district means that the local economy is particularly reliant on the road network for business and customer trips, and in supporting the tourism sector in particular. The construction phase of HS2 will result in significant road transport disruption as a result of local road closures, increased lorry movements and delays.

4.1.2 The HS2 Environmental Statement identifies potential significant increases in numbers of trips on local and strategic roads in Chiltern district but it does not link this with potential delays and costs to business productivity. Estimating the average trip delay time would require extensive modelling, and the cost would not be proportional for this study. Therefore, for the purpose of this exercise a high level approach is taken to estimating impacts using secondary sources, and to some degree an element of judgement based on professional knowledge.

4.1.3 Some of this estimation has also been informed by the business survey results reported in the earlier chapters. Of note is that more than three-quarter (77%) of the businesses that were interviewed during the course of the study stated that delays to traffic resulting from the construction of HS2 would have either a negative or a major negative effect on their operations and performance. Not least, businesses expected:

a. Delays for staff entering or leaving the area, or similarly customers trying to get into the area, representing a cost through knock on effects to scheduling etc.

b. Additional time delays manifesting themselves as lost productivity and additional mileage claims.

c. Trade would reduce as regular customers and passing visitors may be dissuaded from taking trips into the area.

4.2 Costs of delays to resident workers

4.2.1 Based on the information about potential transport disruption relating to the construction of the HS2 line, it is reasonable to assume that traffic delays will permeate across the district's road network and this will impact on working residents' time in travelling to work. The latest Census (2011) count found that there were 43,400 working residents within Chiltern district, and that 47% of these travel to work using road vehicles.

4.2.2 It is assumed that some of these working residents will travel through the affected zones to work. Without trip generation modelling data, it is necessary to estimate what the number might be and for this purpose we assume that about one in two resident commuting trips are impacted. Taking all of this into account it can be assumed approximately 40,534 affected travel to/from work journeys are made by Chiltern district residents per day.

4.2.3 Since the construction programme is yet to take place, it is difficult to calculate the likely time delay without modelling data. Therefore, for this study a 5 minute delay per resident commuting to work and back is assumed (i.e. 5 minutes each way).

4.2.4 The value of this delay on residents commuting to work can be taken from WebTAG (May 2014) Table A1.3.5, which suggest a value of 12.9 pence per person per minute. The total costs are summarised in **Table 4.1** below.

4.2.5 It is estimated that the overall delays to Chiltern district's resident workers could cost in the order of £16m over the duration of the construction phase.

Table 4.1: Estimated potential costs of commuting drivetime delays to Chiltern district's residents

Loss	5 minutes delay per day
Per day	£13,021
Per annum*	£2,605,850
Over the 8 year construction period in present value**	£16,156,043

*based on 200 working days per worker per year
**Present value based on the HM Treasury Greenbook time preference discount rate of 3.5% pa

4.3 Costs of delays to residents non-work related travel

4.3.1 The above figures only provide part of the picture regarding cost because it accounts only for business-related travel. This excludes social, leisure, health and well-being resident trips, which have values too. WebTAG (May 2014) Table A1.3.5, suggest that a lost minute of non-work related travel time is valued at 17.5 pence per person.

4.3.2 The latest estimates taken from the Mid-Year Estimates 2013, identify Chiltern district to have a population of 93,250 residents, and according to the latest National Travel Survey 2013, an average person makes 765 non work related trips per year[25], and 80% are taken by car, van, bus or other private transport[26].

4.3.3 It is also important to consider that the delay for non-work related travel may be less than for work related travel because non-essential travel is mostly likely to frequently occur outside working hour times, which subsequently will have a lower impact on delays. For this reason, we assume that one in four trips (25%) are affected by travel delays as a result of the HS2 line construction. The same 5 minutes delay time is assumed per affected return journey.

4.3.4 Based on these assumptions, **Table 4.2** summarises the combined per annum and the 8 year construction period travel costs that may occur.

Table 4.2: Estimated potential costs of non-work based drivetime delays

Loss	5 minutes delay per day
Per annum	£12,433,300
Over the 8 year construction period in present value*	£77,085,389

*Present value based on the HM Treasury Greenbook time preference discount rate of 3.5% pa

4.4 Costs of delays in business work related travel

4.4.1 The Department for Transport (DfT) Transport Analysis Guidance[27] acknowledges the benefits to businesses from reduced travel times. This includes trips to meetings, site visits and deliveries. The Guidance reviewed a range of approaches to estimating an indicative value based on different methods, such as the willingness-to-pay principle, to arrive at the value of working time travel, which is valued at 51.7 pence per minute per business trip.

[25] Taken from the South East regional average in Table 9906.
[26] Taken from the South East regional average in Table 9903.
[27] Values of Time and Vehicle Operating Costs, Transport Analysis Guidance, DfT (Jan, 2014)

4.4.2 It is possible to estimate the number of business trips on behalf of Chiltern district businesses from the National Travel Survey (2013), which shows that the number of these trips equal 22% of recorded commuting trips[28]. The latest business survey employment data based on BRES (2012) estimates that there are some 32,700 employees and business owners working within Chiltern district, and assuming they all commute to, then 22% are assumed to make a business trip per working day. The number of return business trips therefore calculates at 7,091 per day.

4.4.3 Like for commuting, it is assumed that 50% of these business trips will travel through the affected zones to work and incur a 5 minute delay per trip. As shown in **Table 4.3**, the value of this delay to Chiltern district's businesses could cost in the order of £11m over the duration of the construction phase.

Table 4.1: Estimated potential costs of commuting drivetime delays to Chiltern district's residents

Loss	5 minutes delay per day
Per day	£9,156
Per annum*	£1,832,356
Over the 8 year construction period in present value**	£11,360,450

*based on 200 working days per worker per year
**Present value based on the HM Treasury Greenbook time preference discount rate of 3.5% pa

4.5 Additional road maintenance cost

4.5.1 The considerable number of heavy lorry movements during the construction phase of HS2 will have a damaging effect on the surfaces of the strategic road network in particular. PBA transport planners consider that, at the least, works will be required to plane off, regulate and resurface the roads after the construction has been completed.

4.5.2 High level cost estimates indicate that this could cost approximately £9.1m to complete[29]. This cost estimate is for the resurfacing of the sections of A413 and A355 that will be utilised by construction traffic within Chiltern district. It is acknowledged that some of this cost may be covered by HS2 Ltd under planning conditions.

4.6 Summary

4.6.1 The construction phase will cause significant transport disruption and delays in Chiltern district. As summarised in **Table 4.4**, it is estimated that based on an average delay to road trips of 5 minutes over the construction phase of HS2, these delays could result in £11.3m to Chiltern's businesses and £93m in travel costs to Chiltern's residents.

4.6.2 In addition, it is expected that the strategic road network will need to be resurfaced at the end of the construction phase at an estimated cost of £9.1m.

4.6.3 All these costs will be borne by residents and businesses in Chiltern district.

[28] Taken from the South East regional average in Table 9906.

[29] Estimate includes an allowance for 15% preliminary and 20% contingency. Costs are based on SPONs highway pricing book averages for calculated road area of A413 and A355 in Chiltern and exclude potential kerb replacement. Costs exclude utility diversions and the resetting of any existing covers; design and local authority fees; and any material testing requirements. Rates are subject to regional variations.

Table 4.4: Summary of estimated transport costs.

Cost factor	Cost type	Cost per annum	Total cost	Total cost (NPV)*
Travel delays	Cost to Chiltern's businesses	-£1,832,356	-£14,659,000	-£11,360,000
	Cost to Chiltern's residents	-£15,039,149	-£120,313,000	-£93,241,000
Road maintenance cost	Road maintenance - High level costing exercise	-£1,138,375	-£9,107,000	-£7,058,000

*Present value based on the HM Treasury Greenbook time preference discount rate of 3.5% pa

5 Environmental Impacts

5.1 Introduction

5.1.1 It is well documented that HS2 will have a significant detrimental effect to locations along the proposed route. Some of these direct costs have been considered by the Government and will be compensated through established mechanisms enshrined in statute. However, it is the opinion of Chiltern District Council that there are a number of costs, particularly at the local level, that have so far been poorly represented. The most notable of these will be the impact of lost green infrastructure.

5.1.2 Green infrastructure has the potential to provide a wide range of benefits to many people. However, these benefits (or costs when taken away) are not always fully considered due to difficulties in identifying and quantifying them. Calculating the exact environmental impact of HS2 is a complex matter and therefore attributing a cost to these impacts is a contentious subject. Nonetheless, it is important to consider these impacts when trying to ascertain the true cost of Government's investment on local economies, and those effected.

5.1.3 Valuing a range of benefits that come from the natural environment is not new. There is a growing body of research that has looked at different types of benefits, be they economic, social or environment, and how these can be given a value. However it is very timely because there is a developing policy line nationally that is giving a high and strong profile to valuing the range of benefits that are provided by the natural environment. Two recent and important documents have been the National Ecosystems Assessment[30] and the Natural Environment White Paper 'Natural Choices'.

5.1.4 The aim of this section is to review evidence from academic research and government guidance into the monetary value of green infrastructure in order to assign a cost to the impact that is likely to have on Chiltern district. This follows a "Transfer Value" approach to evaluating environmental impacts is endorsed by DEFRA[31]. This approach is set out in Appendix C.

5.1.5 To do this the we have identified that a reduction in green infrastructure is likely to impact on:

a. Resident and business amenity value gained from the local environment;

b. Resident health and wellbeing;

c. Business productivity; and

d. Visitor value and the impact they have in the Chiltern district economy.

5.2 Identifying impacts

Impact groups

5.2.1 In chapter 2, we highlighted what changes in environmental conditions would be likely within Chiltern district based on the construction of the proposed HS2 route through the district. In addition to the investment in the construction of the route through the district and the impacts of road disturbance on travel patterns, the main impacts would be indirect external impacts on third party users and non-users of the environment that would experience changes in this local

[30] The NEA work can be found online at http://uknea.unep-wcmc.org/

[31] DEFRA, *Valuing Environmental Impacts: Practical Guidelines for the Use of Value Transfer in Policy and Project Appraisal* (December 2009), prepared by Eftec

asset. Since the environment is largely not marketed – at least not in terms of monetary exchange – then it is important to understand the impact based on contingent valuation techniques.

5.2.2 In this study, we specifically focus on the impacts of environmental changes of the proposed HS2 route. The socio economic value of changes to local environmental assets is made up of its total impacts to a range of different individuals and beneficiary groups as follows, and as indicated in **Table 5.1**.

5.2.3 **Residents** - Publicly accessible green space provides important recreation and leisure opportunities for local residents (and workers and visitors), facilitates new leisure and recreational opportunities, which in turn may improve perceptions about the living environment and quality of place among residents and visitors. It may offer residents opportunities to participate in physical and recreational activity - both formal and informal – and, downstream, provide multiple physical health benefits particularly in terms of tackling rising levels of obesity and physical inactivity. Studies have highlighted the value which may be attached to environmental assets (like countryside paths) for recreational purposes together with the scale of the existing asset (for example kilometres of footpaths provided).

5.2.4 Also, differences in house prices between areas show the value that people attach to different characteristics – the property itself and the local environment and amenities. This can be used to indicate the value people attach to characteristics such as views and proximity to the AONB.

5.2.5 **Businesses/Investors** – high quality environments may serve to improve the attractiveness of areas as business locations, helping to attract and retain high value industries, new business start-ups, entrepreneurs and workers. This, in turn, increases the scope for levering in private sector investment, job creation and increasing GVA. In relation to specific business locations, a survey of property developers across Europe found that 95% of respondents believed that open space adds value to commercial property.[32]

5.2.6 Linked to economic growth and investment, there is evidence to suggest that workplaces connected with greener and more attractive environments experience higher productivity, as well as health benefits (such as reduced absenteeism) [33]. Pleasant physical environments and associated green spaces may also assist in helping to retain valued staff, in turn reducing the costs of recruiting and training new staff. This can be reflected by the strong local economic profile of the district, with its high economic activity, strong representation of knowledge based high value sectors like Professional services and ICT, and dynamic small businesses.

5.2.7 **Visitors** - High quality and well managed environmental resources, like the ANOB, can have an obvious and direct impact on tourism and related visitor economy sectors by attracting visitors and tourists that may not otherwise visit the area (e.g. those visitors and tourists for which the natural environment is a primary motivating factor for visiting an area). The environment may also improve visitors' and tourists' sense of quality of place and mental wellbeing, which in turn may generate more spending and encourage repeat visits. It has been estimated that, nationally, some 40% of tourism-related employment is dependent on a high quality environment[34].

[32] Gensler (2011) Open space: an asset without a champion?

[33] See, for example, California Energy Commission (2003) Windows and Offices: a study of office worker performance and the indoor environment; and Institute for Health and Productivity Studies (2004) Health, Absence, Disability and Presenteeism: cost estimates of certain physical and mental health conditions affecting US employers.

[34] National Trust (2001), Valuing Our Environment.

Table 5.1: Impact groups

Beneficiary	Impacts
Residents	• Wide range of quality of life and amenity benefits • Improved access to green space for leisure activities • Physical and mental health benefits • Social cohesion
Businesses	• Enhanced value of sites and premises adjacent to good quality environments • Improved image leading to better investment opportunities Improved attraction and retention of staff • Commercial benefit through the draw of more residents and visitors
Visitors	• Educational benefits • Health and wellbeing • Leisure and recreation

5.2.8 It is obvious that users of Chiltern district's environmental assets gain benefit through a number of direct and indirect effects (such as positive impact on health, etc.). However it is also important to recognise that non-users may also benefit from the environmental quality too. For example, people in urban areas may not actively use the countryside but will nevertheless often still attach a value to its continuing existence.

5.3 Quantifying loss

5.3.1 Before considering the impact, it is worth summarising what will be lost against the total stock. Many of the calculations in the subsequent sections are based on the loss of as a portion of the total residents or dwellings within 1 km^2 of the development, as set out in **Table 5.2**.

Table 5.2: Permanently lost environmental assets as a result of HS2

	Total forecast to be lost (ha)	Total stock within 1km of HS2 (ha)	Percentage loss of total stock within 1km of HS2
Woodland	8.2	163	5%
Agricultural land	106	730	15%

Source: Based on GIS Mapping

5.4 Amenity value

5.4.1 Our analysis uses an approach set out by Mourato et al. (2010) in Chapter 22 of a wider research project research carried out by the UK National Ecosystem Assessment (UKNEA, 2011). This research provides an independent and peer reviewed assessment of approaches to valuing the ecosystem involving the joint-cooperation of natural and social scientists as well as economists, and seeks to estimate amenity value of the environment using a hedonic

pricing method[35] related to property prices. This reflects the NEA's statement (in Ch 22, p1100) that "*homeowners reflect their values for better environments through the amounts they are prepared to pay for houses which enjoy higher levels of environmental quality*".

5.4.2 The starting point for this work is the "Amenity value of Nature" on pages 1100 (Table 22.13) of the UKNEA: Technical Report Chapter 22. This table reveals that many of the land use and land cover variables are highly statistically significant in influencing house prices. Table 22.13 notes that a 1% increase in enclosed farmland and in broadleaved woodland in a land share of 1km sq increases the property value by £123 and £495 respectively. Since this study is based on a mean house value of £243,850 in the London, South West and West area, in Chiltern district this value can be rebased to the much higher average house value of £499,434, which is the highest for any rural authority in Britain[36] and a reflection, in part, of the quantity and quality of the surrounding green infrastructure. This increases the amenity value figures from £123 to £252 for a 1% change in enclosed farmland and £495 to £1,014 for a 1% change in broadleaved woodland.

5.4.3 Using GIS of 1km either side of the track, it was noted earlier that 15% of enclosed farmland and 5% of broadleaved woodland being lost by HS2. So the total value per property is £3,655 for lost enclosed farmland and £5,105 for lost broadleaved woodland. This is then multiplied by the total number of properties within 1 km of the 2,034 properties (which has been calculated by GIS using a similar method above), as shown in **Table 5.3**.

5.4.4 Based on the assumptions used in UKNEA it can be estimated that the woodland and agricultural land permanently lost as a result of HS2 could result in a total loss of approximately £18m from the combined current value of the 2,034 houses located within 1km of the exposed section line. If it is assumed that this loss is over the life expectation of house equivalent to 60 years, then after applying the HM Treasury time preference discount rate of 3.5% (see **Table 5.3**) the total impact is assumed at £6m.

Table 5.3: Estimated potential loss in value of properties resulting from habitat loss

	Cost per property within 1km of the exposed section of HS2	Cost to all properties within 1 km of the exposed section of HS2	Present value cost to all properties within 1 km of the exposed section of HS2*
Agricultural land	£3,655	-£7,433,349	-£2,499,000
Woodland	£5,105	-£10,382,715	-£3,491,000

*Present value based on the HM Treasury Greenbook time preference discount rates

5.4.5 Estate agents consulted during the course of this study indicate that house prices within 1 km of the exposed section of HS2 in Chiltern district are already badly affected and will likely drop further when construction starts.

[35] The hedonic pricing approach is defined as a method where the price of a marketable good (in this case housing) is affected by external factors (such as the loss of certain environmental amenity), which can change the base price. This approach allows researchers to estimate how much people are willing to pay for a good by isolating and considering each external factor in turn.

[36] Halifax (2008) Housing Less affordable in Rural Areas

5.5 Health and wellbeing

5.5.1 Green infrastructure[37] is associated with a number of health and wellbeing benefits. These are intrinsically linked with the provision of open space, primarily focused on access to areas in which people can engage in physical activity. Further to any potential physical health benefits associated with physical and recreational activity, there is also a growing body of evidence which demonstrates the restorative value of green space[38] can have a beneficial impact on mental wellbeing and cognitive function[39].

5.5.2 Values for the benefit of greenspace is detailed in the UKNEA report taken from Table 22.16 page 1105. The report values the marginal change in green infrastructure on both the health improvements arising from additional exercise created by the provision of green infrastructure and more passive forms of contact from viewing nature or being around natural spaces. The UKNEA report firstly relates measures of general health and wellbeing to indicators of local environmental characteristics associated within respondents 1 km^2 distance of their home. The findings suggest a positive relationship with the percentage of environmental amenities to the respondent's health and wellbeing.

5.5.3 The second part of the study related this health/environmental amenity relationship to the monetary values associated with Quality Adjusted Life Years (QALY). QALY is a consideration of the quantity and quality of life that can be generated by certain healthcare interventions. In this case, the 'healthcare intervention' is considered as the change in the environmental amenity that affects the 'quality of life', perhaps more so than the quantity of life.

5.5.4 Mourato et al derives tentative monetary evaluations per person per year[40], which are taken from Table 22.16 of the UKNEA, which estimates the annual health and wellbeing impacts in London, South East and West area of £4-£12 for a 1% change in enclosed farmland and £8-£27 for 1% change in broadleaved woodland. Their initial findings gave monetary values in the form of a range, and we have assumed a mid-point relationship. Based on these assumptions it can be estimated summarised in **Table 5.4** that the total cost to health and wellbeing to the 4,786 Chiltern district residents living within 1 km of the proposed exposed section of HS2 could be as high as £977,145 per annum, and £19m over a 60 year lifetime based on present values using the HM Treasury discount rates.

Table 5.4: Estimated cost to health and wellbeing of residents from habitat loss

	Cost per resident	Total cost per annum to all residents within 1km of exposed section of HS2	Present value cost to all residents within 1km of the exposed section of HS2 over 60 years*
Agricultural land	-£116	-£555,438	-£11,206,000
Woodland	-£88	-£421,706	-£8,508,000

*Present value based on the HM Treasury Greenbook time preference discount rates

[37] For example, this includes open unenclosed landscapes, agricultural land, and broadleaved and coniferous woodlands.

[38] For example, The social and environmental benefits of forests in Great Britain, Willis, Garrod et al (2003),

[39] For example, 'The mental and physical health outcomes of green exercise' Pretty, J et al (2005)

[40]

5.6 Business productivity

5.6.1 Linked to economic growth and investment, there is evidence to suggest that workplaces connected with greener and more attractive environments lead to higher labour productivity, as well as health benefits (such as reduced absenteeism). Pleasant physical environments and associated green spaces may also assist in helping to retain valued staff, in turn reducing the costs of recruiting and training new staff.

5.6.2 Business interviews undertaken during the course of this study, and summarised in chapter 4 of this report, corroborate this relationship in Chiltern district. It was found that the majority of businesses (56%) identified that their proximity to the AONB has either a positive or very positive impact in improving the productivity of their labour force.

5.6.3 According to the CBI, the average absence of UK employees equates to 6.8 days, of which some 95% is attributable to short-term sick leave[41]. For each employee who takes up physical exercise for 30 minutes a day, five times a week as a result of a walking or cycling intervention, the annual benefit to employers is, on average, at least 0.4 days gross salary costs. Following this logic, then these business benefits may be monetised on the basis of salary costs and the numbers of workers affected.

5.6.4 Data supplied by the Annual Survey of Hours and Earnings calculates that the average yearly wage in the Chiltern district is £28,809[42] which equates to £110.80 per day. Therefore, the 0.4 days of salary lost equates to £44.30 per employed resident per year.

5.6.5 BRES data indicates that approximately 2,900[43] people are employed in the area within 1km of the proposed line. Taking all of this into consideration, this gives a total cost per year as £128,528. It should however be noted that this figure assumes that employment and wages will remain constant throughout the period, which is contrary to many economic forecasts. For instance, Experian data notes that growth in employment could be expected to rise by 13.3% by 2030.

5.7 Visitor economy

5.7.1 Tourism is a key component of the Chiltern district economy, with the AONB in particular being a major draw for staying and day visitors. High quality and well managed GI can have an obvious and direct impact on tourism and related visitor economy sectors by attracting visitors and tourists that may not otherwise visit the area (e.g. those visitors and tourists for which the natural environment is a primary motivating factor for visiting an area). GI may also improve visitors' and tourists' sense of quality of place and mental wellbeing, which in turn may generate more spending and encourage repeat visits.

5.7.2 The Chilterns AONB Visitor Survey 2007 showed that the average daily spend per visitor per day was £8.54, which equated to total expenditure associated with trips to the Chilterns AONB to be £337m per annum, rising to £472m when multiplier effects are considered.

5.7.3 It is important to note that these estimates refer to 2007 values, and are likely to be higher given current prices. In the absence of more current tourism value estimates for Chiltern district, the figures have been grown in line with Tourism South East trends to give an overall visitor spend estimate of £619m.

5.7.4 It is important to acknowledge that this refers to the value of the total AONB area, rather than the 16.6% (5,018 hectares) that lies within Chiltern district.

[41] The lost billions: absence and labour turnover survey, CBI, (2004)

[42] Annual Survey of Hours and Earnings, Workplace earnings, (2013)

[43] Business register and Employment Survey, (2012)

5.7.5 Assuming that each hectare generates the same value in visitor spend it can be estimated that the portion of the total spend per year in Chiltern district is £37.3 million per year, equating to £7,427 per hectare. Based on the predicted loss of AONB area in the district as a result of HS2 (203.3 hectares) it can be estimated that £1,510,000 per annum of visitor spending could be lost from the local economy.

5.7.6 It is also important to note that the estimates above focus on a reduction in the quantity of land alone. The calculations do not however consider the wider impacts of noise and visual impact on the quality of a place as they are difficult to quantify. Similarly we have not estimated the additional cost to the local economy of lost visitors and spend during the construction phase of HS2 as there is little evidence to base such an estimate on. The relative closure of the countryside for recreational use during the 2001 Foot and Mouth Disease epidemic severely hit the tourism sector, with a reported average annual turnover loss of £50,000 per business in Cumbria for example[44]. Applying such assumptions to the district economy would however be inappropriate as although the area will be severely disrupted it will not be shut off to visitors. However, it is considered that the loss of annual visitor spend to Chiltern district, as identified in paragraph 5.7.5 above, is a conservative estimate since there will be travel disruptions and reductions is landscape quality which is likely to reduce overall visitor numbers and spending.

5.8 Mitigating against loss

5.8.1 This chapter has highlighted a range of quantified effects on the Chiltern district economy that are likely to occur as a result of the permanent loss of environmental assets. Some of these quantified costs will be ongoing as the environmental assets for which the district is best known will be damaged or lost for ever. It is very important to recognise that the direct loss of amenity and indirect loss of economic activity in the Chilterns also has a wider impact on businesses outside of Chiltern district that will be supplying residents, businesses and visitors within the district.

5.8.2 The HS2 Environmental Statement sets out the HS2 Ltd aim of seeking to achieve no net loss in biodiversity at the route-wide level. Given the status of the Chilterns AONB and the value of the environmental assets that will be lost to the nation, including Ancient Woodland, mitigation to achieve no net loss is not achievable.

5.8.3 The House of Commons Environmental Audit Committee Report on HS2 and the Environment states that *"it is important that if HS2 proceeds, the House is able to demonstrate it has at least fully followed the purposes and processes, to address environmental risks and to prevent or mitigate them, that should be expected of any other development of this scale"*. With regard to this, paragraph 19 on page 10 sets out that in accordance with the NPPF, *"the HS2 Environmental Statement must be revised to distinguish clearly between 'mitigation' and 'compensation' measures in respect of biodiversity, and to explain the factors determining in which cases these should be applied"*. It goes on to state that *"if biodiversity loss is genuinely unavoidable and also cannot be mitigated, compensation measures should be applied to the fullest extent possible"*.

5.8.4 The Environmental Statement mitigation proposals do not offset the quality and extent of high value environmental assets that would be lost, that cannot be replaced, in Chiltern district. The quantified cost to the local economy, as identified in chapters 4 and 5, for which the district should be compensated for fully would cover the cost of tunnelling HS2 through the whole of Chiltern district and beyond. The option of tunnelling through the whole district would therefore offset against both long term environmental and economic loss and help HS2 Ltd towards achieving no net biodiversity loss at the route-wide level.

[44] Cumbria County Council (2001) Cumbria Foot and Mouth Disease Inquiry Report, page 64

5.9 Summary

5.9.1 Based on internationally accepted standards for calculating the cost of lost green infrastructure it can be estimated that the Chiltern district economy will lose approximately £2.9m from its economy per annum as a result of a loss of amenity, diminished health and wellbeing, reduced labour productivity and lost visitor spend.

5.9.2 Many of the costs involved with the loss of green infrastructure are in perpetuity to the Chiltern district economy, and whilst proposed restatement of footpaths and cycleways will help to mitigate against the loss, the ongoing disturbance to the areas tranquillity and visual scarring cannot be reversed. In line with HM Treasury Greenbook guidance, the longer term impacts are shown in present value over a 60 year project plan using the government's proposed discount rates. The total loss is therefore estimated to total -£58.8m based on the estimates in **Table 5.5.** The calculations are based on the mid-point of the planned 2017 to 2024 construction period to 2080.

Table 5.5: Summary of estimated green infrastructure cost by 2031.

Cost factor	Cost type	Cost per annum	Total cost	Total cost (NPV)
Amenity loss	Local enclosed farmland impact on house values	-£123,883	-£7,433,000	-£2,499,000
	Local Broadleaved / mixed woodland on house values	-£173,050	-£10,383,000	-£3,491,000
Health and wellbeing impact	Loss of local enclosed farmland	-£555,438	-£33,326,000	-£11,206,000
	Loss of local Broadleaved / mixed woodland	-£421,706	-£25,302,000	-£8,508,000
Productivity loss	Productivity loss to businesses	-£128,528	-£7,712,000	-£2,593,000
Visitor spending loss	Cost per year to visitor economy	-£1,510,717	-£90,643,000	-£30,479,000

6 Conclusion

6.1.1 This report identifies that the HS2 route through the Chilterns will result in medium-term travel disruptions and a permanent loss of property, land and greenspace along the exposed surface rail route.

6.1.2 Based on some indicative estimates, we have considered likely social, economic and health & wellbeing impact values that might be lost from the disruption of constructing the HS2 line, and the legacy of visual scars on the physical landscape and noise, which will in some cases lead to blight of properties and businesses, and annoyance to others. The results are summarised in **Table 6.1**.

Table 6.1: Summary of estimated cost of HS2 to the Chiltern district by 2031

	Estimated costs at current present values (£m approximate)
Travel delay costs (for 8 year construction period)	£104.6
Road maintenance cost (for 8 year construction period)	£7.1
Amenity loss (present value over 60 years)	£6.0
Health and wellbeing impact (present value over 60 years)	£19.7
Productivity loss (present value over 60 years)	£2.6
Visitor spending loss (present value over 60 years)	£30.5
Total estimated cost to Chiltern district	**£170.4**

6.1.3 This evidence provides a demonstrable overview of the impacts and their monetarised costs to Chiltern district, which would be equivalent to more than half the cost of tunnelling the whole route through the Chilterns. With the inclusion of impacts on other Chilterns AONB areas outside of Chiltern district, and the omission of effects which cannot be easily measured or monetarised, then the full cost of tunnelling are likely to be outweighed by reducing the substantial negative impacts.

6.1.4 It is reasonable to assume that the HS2 will generate substantial gains for areas where there will be a stopping station. But no station is planned in, or even close to, Chiltern district, so local benefits will be absent. Therefore, the only impacts for the district would be one sided, and this needs to be understood so that appropriate mitigations are put in place.

6.1.5 The environment is being increasingly recognised as a valuable resource that has the potential to deliver multiple benefits, and there is a large literature around the importance and value of the environment to people's wellbeing[45], which should be considered by the Government when making investment and planning decisions. At a time when there is increasing competition for space and a need to make use of the resources that we have in the spirit of sustainable development, it is vital that we seek to make best use of our environmental resources and obtain the best multiple benefits from them now and in the future.

[45] For example, see UK National Ecosystem Assessment (UKNEA, 2011) supported by DEFRA.

Appendix A Economic Profile

Introduction

This section sets out a socio-economic profile for Chiltern district. It highlights key data, trends and forecasts for the population and economy, identifying in particular strengths and weaknesses of the district and factors that set it apart from other areas.

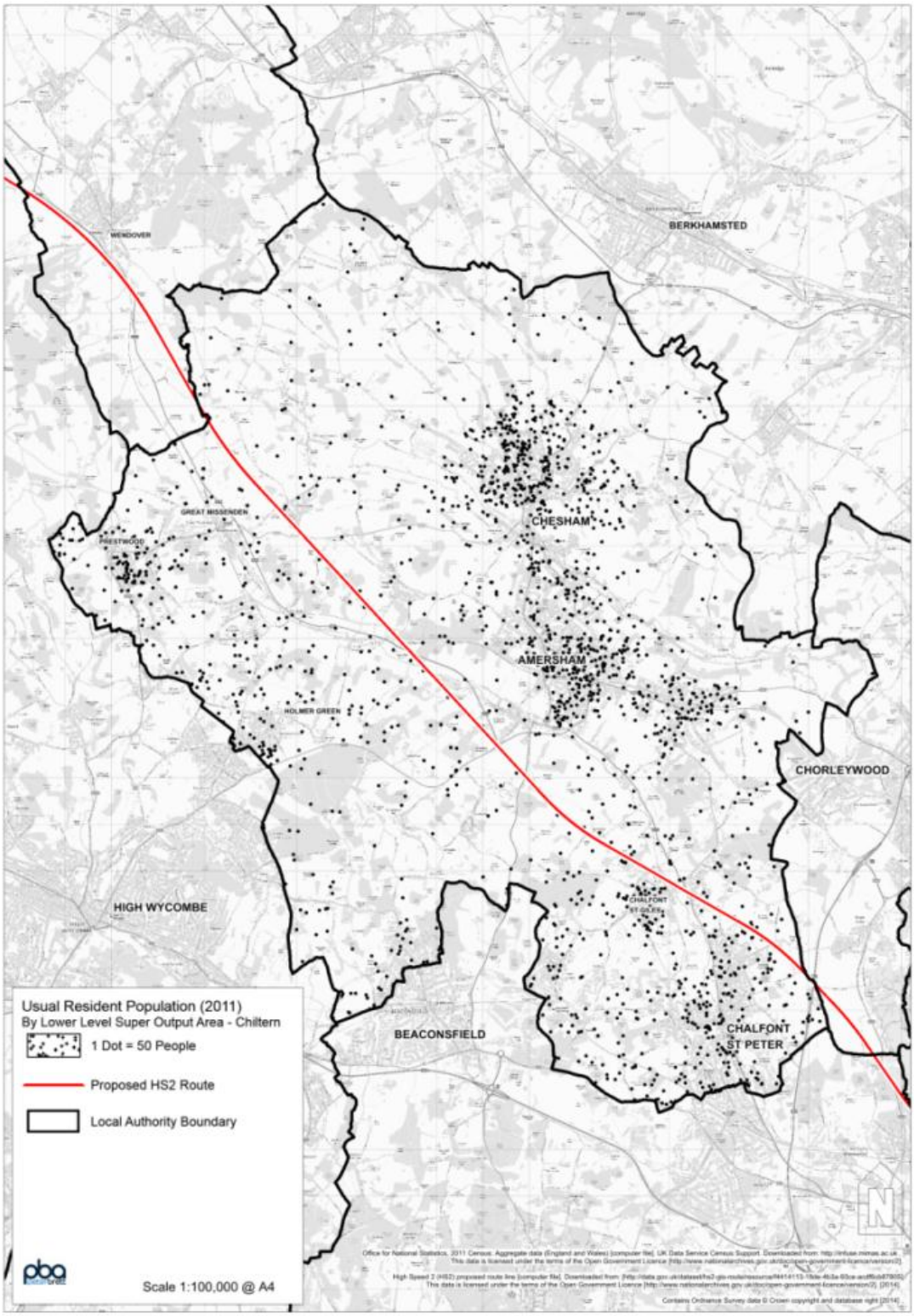
Population

Chiltern district is located in the Metropolitan Green Belt, some 15-20 km (9-12 miles) from the North West edge of London. It covers an area of approximately 196 sq km (76 sq miles), 72% of which is protected by AONB status and 88% is within the Green Belt.

According to the latest ONS midyear estimate (2013), Chiltern district has a population of approximately 93,250 residents, 59% of whom are working age. This equates to approximately 18% of the total residents in Buckinghamshire.

Approximately 86% of the population live in settlements of over 1,500 residents, including the main towns of Chesham, Amersham and Chalfont St.Peter (see **Figure A.1**). Overall the population density stands at 473 people per square kilometre, greater than that recorded across Buckinghamshire (327 per sq km) and England (411 per sq km).

Figure A.1: Population spread across Chiltern district, 2011



Source: Census 2011

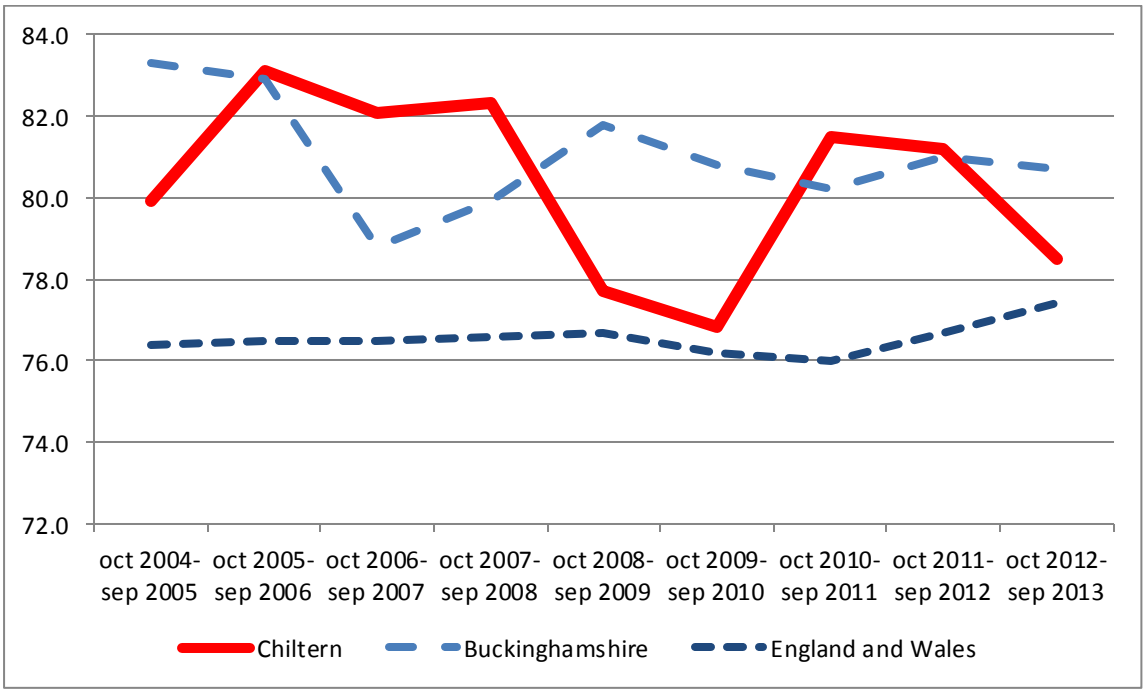
Economic Activity

Economic activity

The economic activity rate in Chiltern district is good at 79%[46]. This is above the England and Wales average of 77%. Analysis of trends over the last decade however shows that the economic activity rate of Chiltern district was between 3.5 and 6.5 percentage points above the national level.

In general terms higher than average economic activity rates can be attributed to more employment opportunities and better salaries. These factors tend to increase for higher skilled workers and higher productivity sectors, with higher value jobs paying more, which increases the willingness of working age residents to enter the labour market.

Figure A.2: Economic Activity Rate by Area



Source: Annual Population Survey

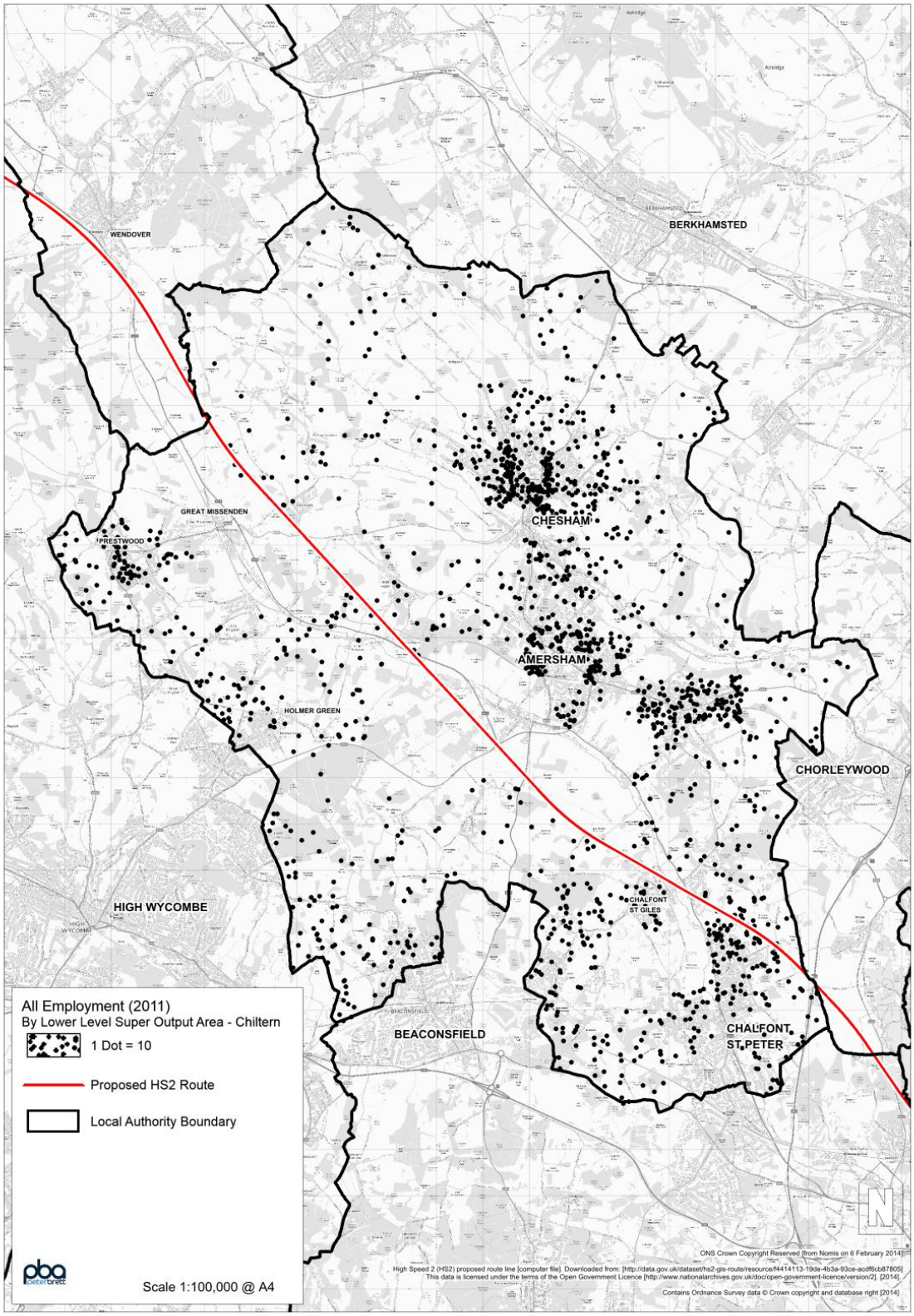
Employment

The employment rate in Chiltern district is approximately 77% of the working age population. This is broadly in line with the national average but greater than Buckinghamshire (76%).

The spread of employment across Chiltern district is illustrated in **Figure A.3**. As would be expected this shows particular concentrations of employment in and around the main towns of Chesham, Amersham and Chalfont St.Peter. It also shows that there is a fairly even split of jobs on either side of the proposed HS2 route. Staff and customer trips across the proposed route will be severely disrupted during the construction period of HS2 in particular.

[46] Annual Population Survey October 2012 to September 2013

Figure A.3: Economic Activity Rate by Area



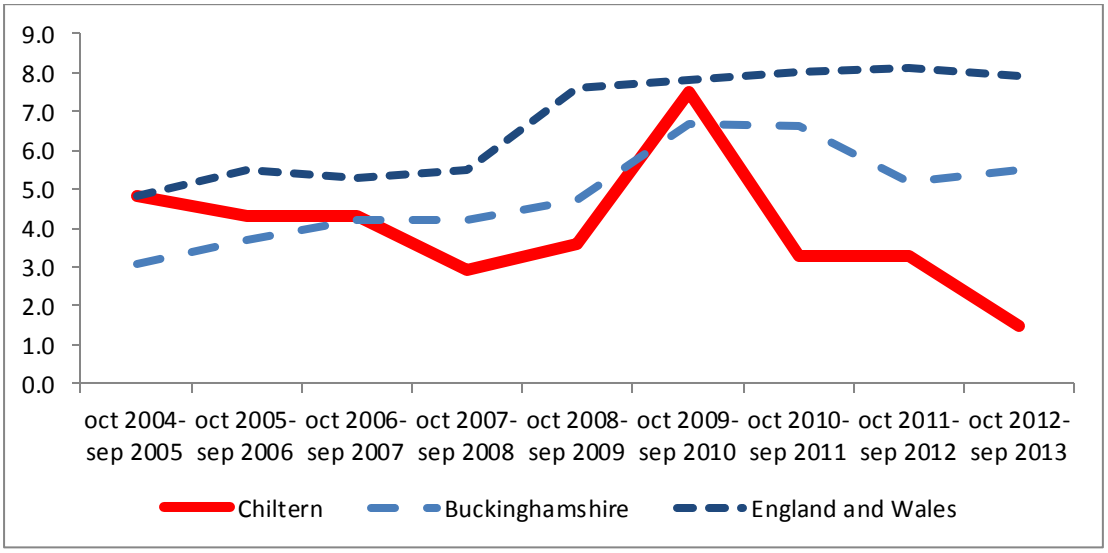
Source: BRES, ONS

Unemployment

Unemployment data shows that both Chiltern district and the wider area of Buckinghamshire perform well in comparison to the national average. The claimant count, which monitors the number of people claiming Jobseekers allowance, an unemployment-related benefit, has consistently remained significantly lower than the national, and slightly lower than the county level, between 1996 and 2013.

The Annual Population Survey provides a greater indication of true unemployment than the Claimant Count. Analysis of the unemployment rate shows that Chiltern district between October 2012 and September 2013 Chiltern district had a very low unemployment rate of 1.5%, compared to 5.5% in Buckinghamshire and 7.9% across England and Wales.

Figure A.4: Unemployment Rate Over time



Source: Annual Population Survey

Earnings

The average full time earnings of Chiltern district residents are significantly higher at £38,062 in 2011 than the benchmark comparator areas of Buckinghamshire (£33,045) and the UK as a whole (£26,095). In contrast, work based earnings in the district are considerably less than residents earnings, implying that a considerable number of residents travel to London to work. This has significant implications for housing affordability in the district, which is discussed next.

Figure A.5: FT Average Salary – Chiltern district Residents / Chiltern district workers 2011

Source: Ashe, 2011 and 2013

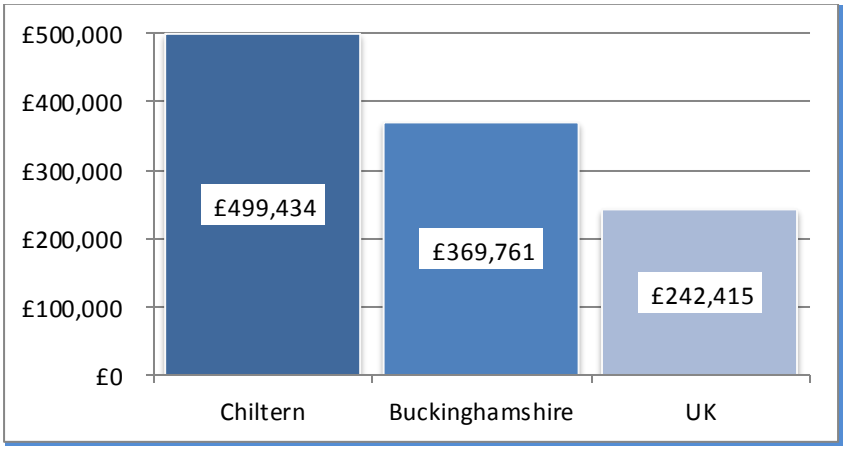
Housing affordability

Land Registry records show that the average house price in Chiltern district is £499,434, which is the highest average price for any rural local authority in Britain[47]. This average price is significantly higher than Buckinghamshire as a whole (£369,761).

Figures produced by HM Revenues & Customs from a sample of taxpayers show that in 2010/11, the mean (average) income per household was £47,400.

Therefore, based on the mean average household income, it can be estimated that the house price affordability ratio for Chiltern district is approximately 10.5. This makes the district one of the least affordable areas of the UK.

Figure A.6: Average House Prices, Q2 2013



Source: Land Registry

[47] Halifax (2008) Housing Less affordable in Rural Areas

Workplace Economy

Employment by Sector

The latest employment data for Chiltern district, based on BRES, identifies that in 2012 there were 32,700 jobs in the district. As shown in **Table A.1**, the Professional, scientific & technical services are the largest single employment sector. While in comparison to the national average and county averages, the sectors that appear to be over-represented locally are Professional Services, scientific & technical services, Information and Communication, Education and Arts, entertainment, recreation & other services.

This data is important as we draw assumptions about which sectors are most likely to benefit from greener and more rural setting like the Chilterns and, conversely, which sectors are likely to locate themselves in an area regardless of location factors. For instance from empirical evidence we can see that higher knowledge based sectors such as Professional Services and Information & Communications exhibit a greater propensity to locate where location factors are of greater importance. Sectors such as Public Services, Transport & Storage and Utilities, for which Chiltern district has a lower representation, are more likely to be much more demand-led in terms of where they wish to relocate.

Table A.1: Employment by sector, 2012

	Proportion of total jobs		
Industry	**Chiltern District**	**Buckingham -shire**	**England & Wales**
Agriculture, forestry & fishing	0%	0%	2%
Mining, quarrying & utilities	1%	1%	1%
Manufacturing	8%	7%	8%
Construction	6%	6%	5%
Motor trades	2%	2%	2%
Wholesale	5%	7%	4%
Retail	11%	10%	10%
Transport & storage	2%	3%	5%
Accommodation & food services	6%	6%	7%
Information & communication	7%	6%	4%
Financial & insurance	3%	2%	4%
Property	3%	2%	2%
Professional, scientific & technical	13%	10%	8%
Business administration & support services	4%	8%	8%
Public administration & defence	2%	3%	5%
Education	12%	9%	9%
Health	12%	11%	13%
Arts, entertainment, recreation & other services	6%	5%	4%
Column Total	100%	100%	100%

Source: BRES

Economic structure

There are approximately 5,300 businesses in Chiltern district. Of these, 93% are classified as micro-businesses. This is significantly higher than the county (91%) and UK (89%) averages, reflecting the rurality of the district and the attractiveness of the area to those wishing to start-up lifestyle types of

business. The importance of these businesses to the economy should not be underestimated as they are key components of the supply chain, delivering significant upstream and downstream benefits.

Table A.2: Business Sizes, 2011

	Micro (0-9 employees)	Small (10-49 employees)	Medium (50-249 employees)	Large (250+ employees)
Chiltern district	93.0%	5.7%	1.0%	0.3%
Buckinghamshire	91.2%	7.0%	1.4%	0.3%
UK	88.8%	9.2%	1.6%	0.4%

Source: ONS UK Business Counts

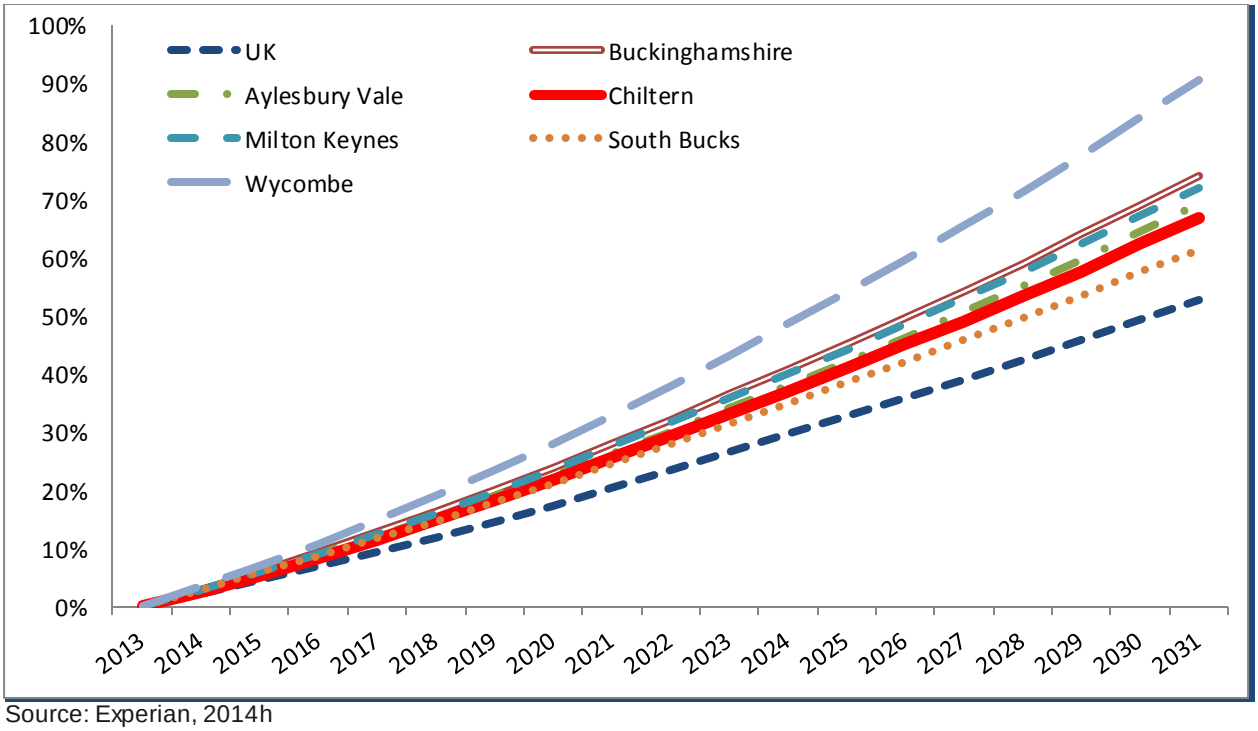
Economic productivity

Buckinghamshire has the 12th highest productivity rate, as measured by GVA output divided by working age population, of any county council area in the UK. As would be expected, the highest performing councils are those located within or around the London, in fact in this instance ten out of the eleven councils are ones based within the Greater London area. This means that Buckinghamshire is the second-most productive council outside London, second only to Berkshire.

While Chiltern district's productivity is not the highest in Buckinghamshire, it should be noted that at £39.9k per resident it still performs higher than the local authority average of £29.6k per resident, which includes all local authorities that fall outside of Greater London.

In terms of productivity growth, Chiltern district is expected to increase productivity by 2031 by 66% outstripping the national average of 50%. This is particularly significant due to the district's relatively lower population growth as discussed previously.

Figure A.7: Productivity Growth in Buckinghamshire compared to UK, 2013-2031



Source: Experian, 2014h

Economic output

Experian Economics provides a detailed analysis of GVA by industry, and which sectors in the district's economy are forecast to grow and which are likely to experience decline between 2013 and 2031. This is based on their Regional Planning Service forecasts.

As shown in **Table A.3**, Experian Economics forecast that the best performing growth sectors in the Chiltern district economy are in the knowledge based industries such as Pharmaceuticals, Computing and I.T. services, while those sectors likely to experience the most declines are traditionally the lesser skilled employment sectors, particularly manufacturing.

Table A.3: Forecast GVA Growth by Sector in Chiltern district, 2013-2033

Best performing sectors		Worst performing sectors	
Recreation	107%	Textiles and clothing	-80%
Telecoms	102%	Metal products	-21%
Accommodation & food services	96%	Wood and Paper (manufacture of)	-6%
Pharmaceuticals	96%	Non Metal products manufacturing	-1%
Computing and I.T services	91%	Fuel Refining	0%

Source: Experian, 2014

Sector Analysis

Tourism

Tourism is a key component of the Chiltern district economy, with the AONB in particular being a major draw for staying and day visitors. The countryside is attractive to ramblers, cyclists, horse riders and there are many indoor and outdoor attractions to enjoy. The AONB Visitor Survey highlighted that the most popular reason given for visiting was to go walking, with 44% of all responses.

The AONB attracts approximately 55 million visits and £336.8 million of spend per year[48]. This increases to £471.6 million when multiplier effects are factored in. Of this total, some 9.3 million visits are from staying and day visitors from outside the AONB, who spend approximately £196 million.

This level of annual visitor spend is greater than that recorded for Loch Lomond and the Trossachs, Northumberland, the Cairngorms, the New Forest, Dartmoor and Exmoor National Parks. In addition, in attracting £2,338 of visitor spend per hectare, Chilterns AONB is one of the most popular natural environments in Great Britain in terms of size, ranking above the Yorkshire Dales, New Forest, South Downs, Snowdonia, Northumberland, Brecon Beacons, Exmoor, Dartmoor, Loch Lomond and the Cairngorms.

[48] Chilterns AONB Visitor Survey 2007/2008

Figure A.8: Visitor spend per year (£million) – excluding local day trips

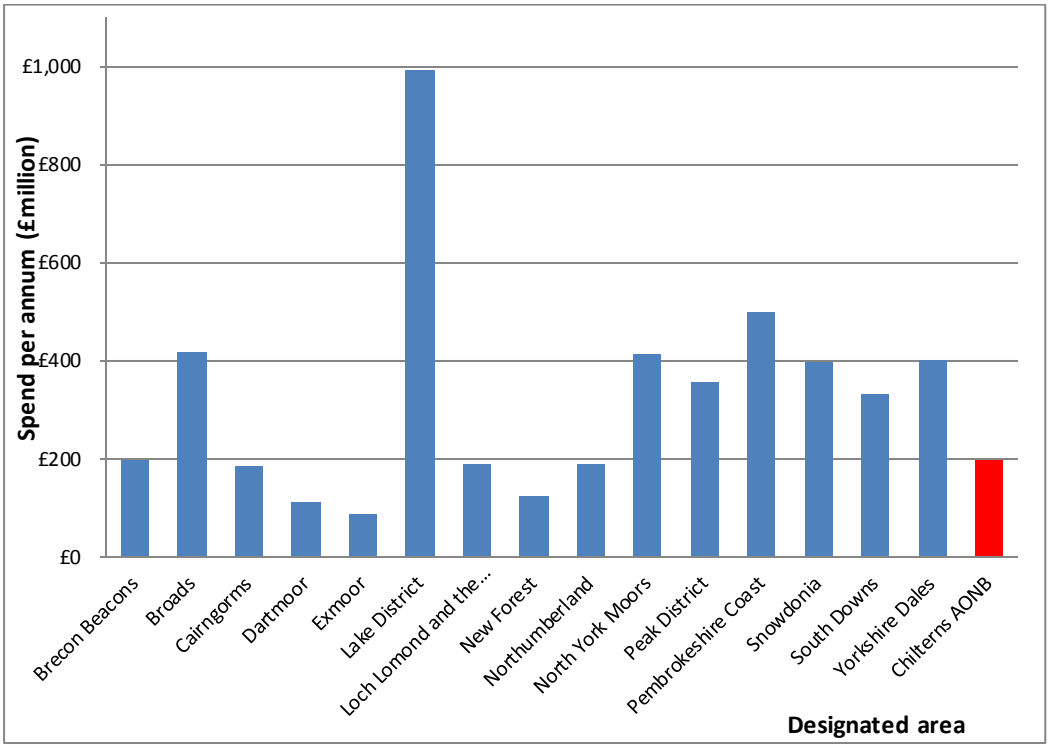
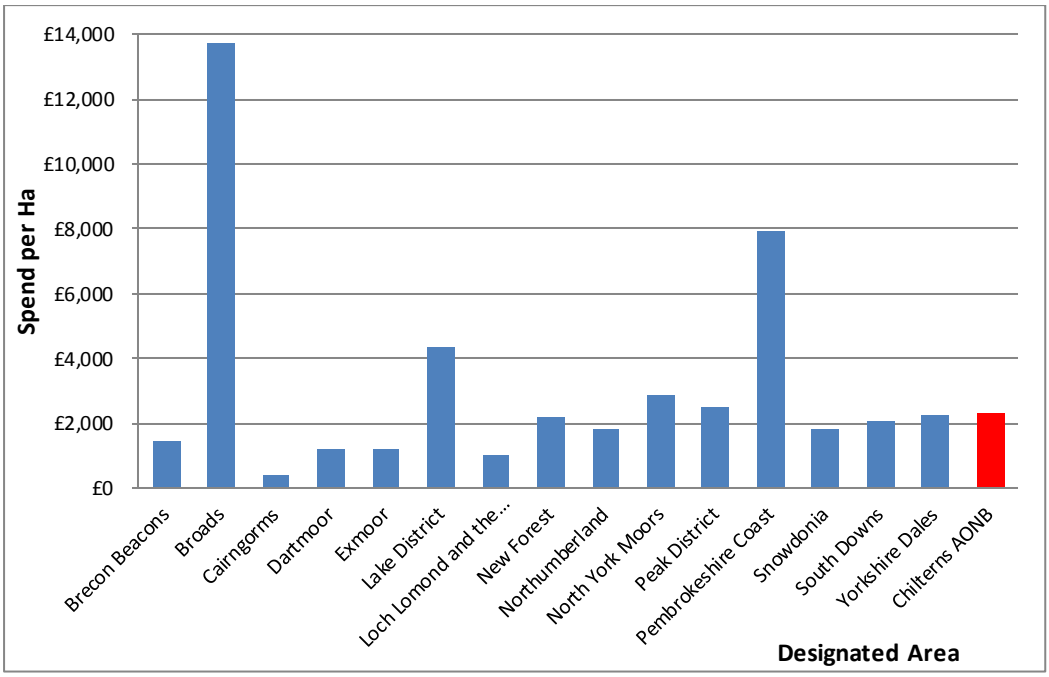


Figure A.9: Visitor spend per Hectare (£)



Source: Visitor numbers and visitor spend figures have been taken from STEAM reports, mostly from 2009. Figures updated on this page 3 October 2012. Lake District figures updated 6 August 2013. Chilterns AONB figures are derived from the AONB Visitor Survey 2007/8.

Construction

HS2 Ltd estimate that the construction of phase 1 of HS2 will support approximately 9,000 jobs, of which 1,500 will be permanent. It is important therefore that the baseline assessment focusses on the construction sector in Chiltern district, examining how well it is placed to benefit from the opportunities when contracts are tendered.

Analysis of BRES shows that the construction sector employs 4.6% of the total population in Chiltern district. The sector is therefore relatively poorly represented compared to the national average.

Looking at data regarding the size of businesses in the construction sector it appears that a large proportion are very small, with 97% of the total construction companies in Chiltern district having less than 10 employees, compared to 93% across England and Wales. At the other end of the scale, there are no medium and larger (employing over 50 staff) found in the district. This has implications for businesses capacity to tender for work on the HS2.

On a broader level, our analysis shows that unemployment rates in the district are consistently below the national and county average and are predicted to fall in line with national and regional forecasts. Therefore, considering the relatively well performing economic climate of the district we can assume that the impact of new jobs created in the district is likely to be less relative to other areas.

To examine the impact of job creation in more detail, the claimant count gives a valuable insight into the capacity of an area to incorporate new employment as it breaks down the job seeking population into the types of occupation sought. The claimant count shows that in Chiltern district only 2.3%, or approximately 15 people, were seeking construction related jobs, and would therefore benefit from this project.

Given the relatively small proportion of the population seeking work in the construction industry, coupled with the relatively smaller sized construction-related businesses located within the area, the economic benefits propagated may be less than envisaged.

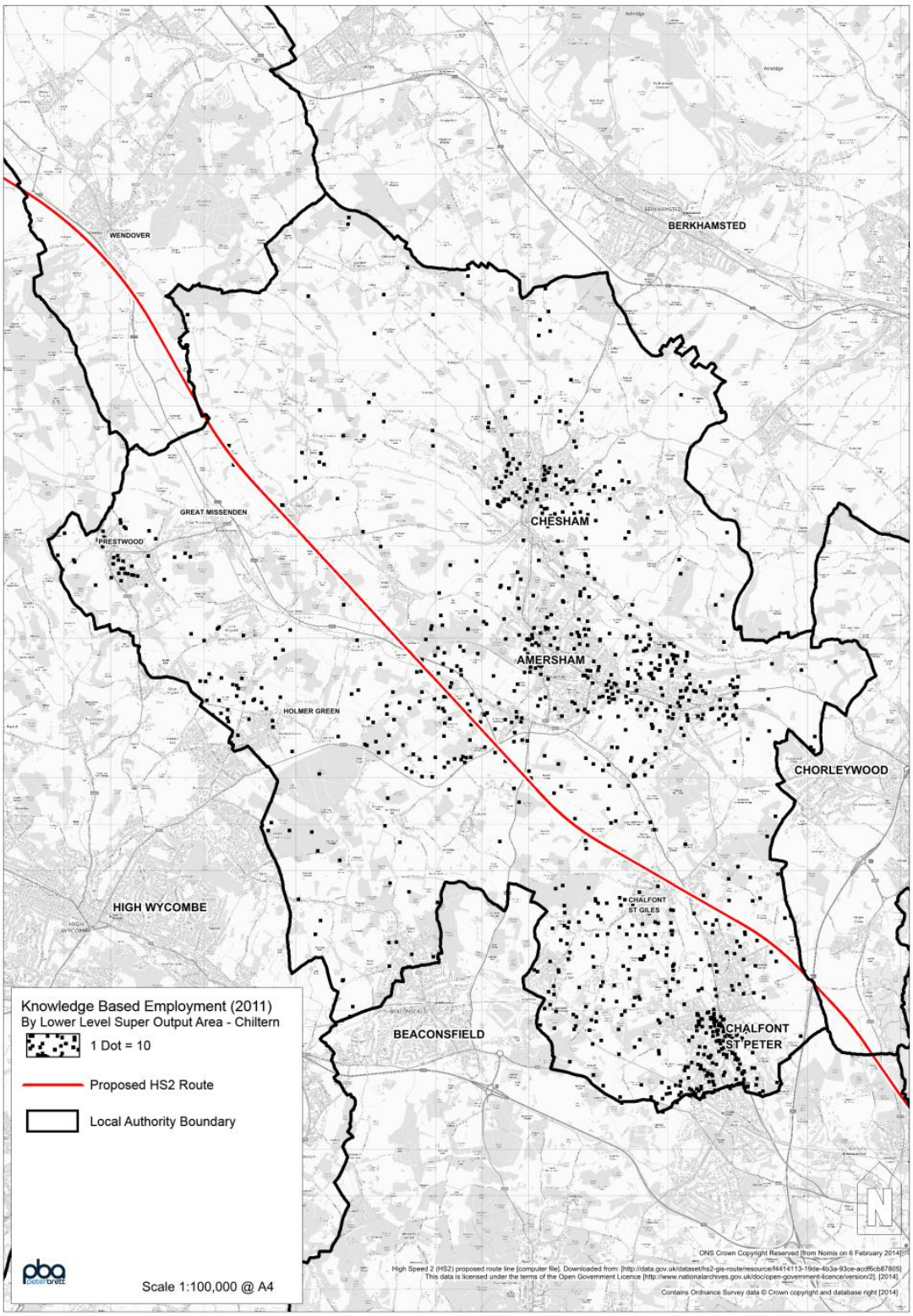
Knowledge based economy

The Knowledge Based Economy (KBE) employment sectors tend to provide high and fast-growing productivity and assist the industries they serve by providing the means (through technical efficiencies) to increase their productivity rates. Therefore, the KBE sectors are regarded as key drivers of productivity and economic growth. However, they do not necessarily increase employment (i.e. a rise in productivity and efficiencies may translate into fewer jobs). **Figure A.10** illustrates that spread of KBEs across Chiltern district, again this is evenly spread both sides of the proposed HS2 route.

Employment in the KBE in the district accounts for 23% of total employee jobs. This is closely in line with the proportion of KBE recorded across the Buckinghamshire (also 23.0%), but higher than nationally (21%).

Analysis of location quotients reveals that all the sectors that the district is best represented in compared to the national average are within the knowledge based economy. The best represented sector is the 'manufacture of pharmaceuticals' with a location quotient of 24.1, with the majority of jobs being at GE Healthcare, the largest private sector employer in the district. Indeed, Chiltern district is recognised as being a key location for R&D on Natural Sciences and Engineering in the UK. The district is also well represented in 'programming and broadcasting activities' (LQ = 4.3), 'other professional, scientific and technical activities' (3.3), 'scientific research and employment' (3.20 and 'activities of head offices; management consultancy services' (2.5).

Figure A.10: Knowledge based Employment in Chiltern district 2012



Source: BRES

Entrepreneurship

There are very high levels of entrepreneurship in Chiltern district, and across Buckinghamshire as a whole. Between 1995 and 2007 VAT Registrations data shows that on average 46 businesses are started per 10,000 adults in the district, compared to 44 in Buckinghamshire and 29 across England and Wales. There is therefore a clear link between high qualification attainment level, quality of life and rates of entrepreneurship.

Table A.4: VAT Registrations and De-registrations, 1995-2007

	Chiltern district	Buckinghamshire	Eng & Wales
Average annual VAT registrations per 10,000 adult population	46.5	44.1	29.1
Average annual VAT de-registrations per 10,000 adult population	38.5	36.0	24.3

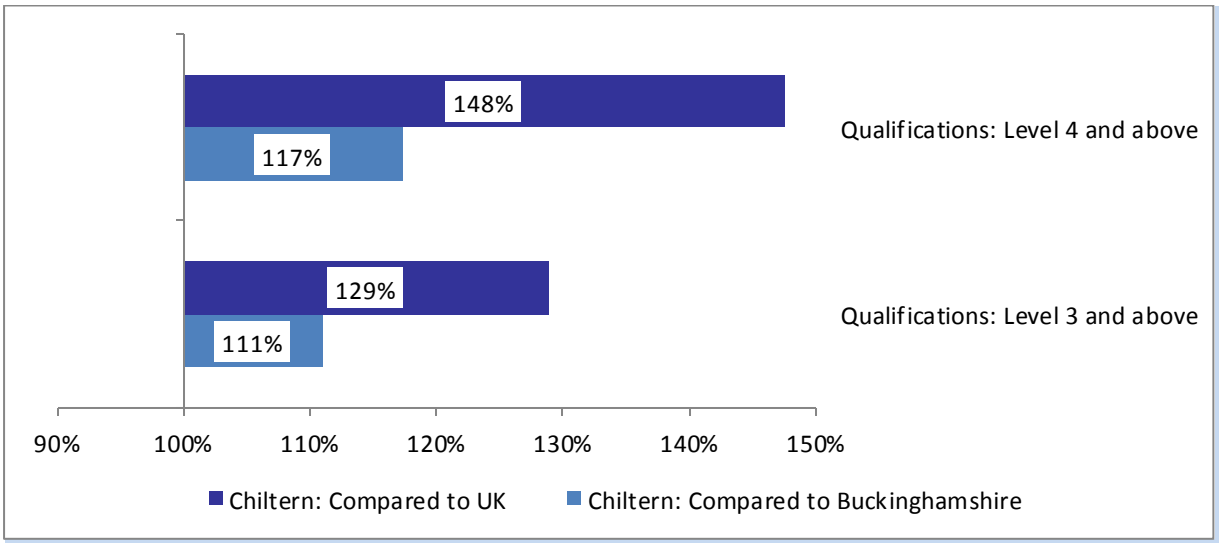
Source: NOMIS. VAT Registrations/Deregistrations, 1995-2007. Published by the Department for Business, Enterprise and Regulatory Reform

Labour Market

Skills and qualifications

Education data from NOMIS indicates that Chiltern district has a significant proportion of higher qualified residents than both the county and national average. Educational attainment is split into 8 categories with an assumption of higher education as both level 3 and above (i.e. A-level) and level 4 and above (Certificate of higher education). Using Buckinghamshire as a base rate (equal to 100) Chiltern district has 11% more residents, as a proportion of the total residents, with level 3 qualifications and 17% more with level 4 qualifications. Similarly, and compared with the national level, Chiltern district has 29% more residents level 3 qualifications and 47% more with level 4 and above.

Figure A.11: Qualifications attainment



Source: Annual Population Survey 2013

Travel to work

Approximately 57% of Chiltern residents travel to work by car or van. This is higher than the level recorded across England and Wales (54%). District residents also favour travelling to work by train (13%), again higher than the level recorded nationally (13%). In contrast however, relatively few people walk, cycle or catch the bus to work in Chiltern compared to the national average.

Table A.5: Method of Travel to Work

Method of travel to work	Chiltern	Chiltern %	England & Wales %
All categories: Method of travel to work	45,189		
Work mainly at or from home	7,343	16	10
Train, underground, metro, light rail or tram	6,043	13	9
Bus, minibus or coach	596	1	7
Driving a car or van	25,755	57	54
Passenger in a car or van	1,628	4	5
Bicycle	398	1	3
On foot	2,782	6	10
All other methods of travel to work	644	1	2

Source: Census 2011

Comparison with other Local authorities on the HS2 route

This section compares the socio-economic characteristics of Chiltern district with other local authorities that phase 1 of HS2 passes through (i.e. those authorities without an HS2 station). These are: Hillingdon, Three Rivers, Aylesbury Vale, Cherwell, Chiltern, South Bucks, Wycombe, Stratford-on-Avon and Warwick.

Analysis of these areas can determine how Chiltern district is likely to benefit, or perhaps more likely lose out, when compared to other authorities on the route. The key performance indicators for Chiltern district and the other authorities are identified in **Table A.6**.

Table A.6: Key performance indicators – Local Authorities that HS2 will pass through

	Chiltern district	Average of all other authorities (excl: Chiltern district)	UK
Population (2011)	92,635	146,738	56,075,912
Average House Price (June 2013)	499,434	346,265	242,415
Average Wage (2011)	38,062	30,914	26,095
Productivity (GVA / Working age Population) (2013)	37	43	34.6
Productivity Growth (2013)	56%	45%	37%
Claimant Count Rate (Dec 2013)	1.2%	1.3%	2.9%
Qualifications (Level 3+) (Dec 2013)	48%	46%	40%

Qualifications (Level 4+) (Dec 2013)	37%	34%	27%
Looking for construction work (Dec 2013)	2.3%	2.5%	2.8%

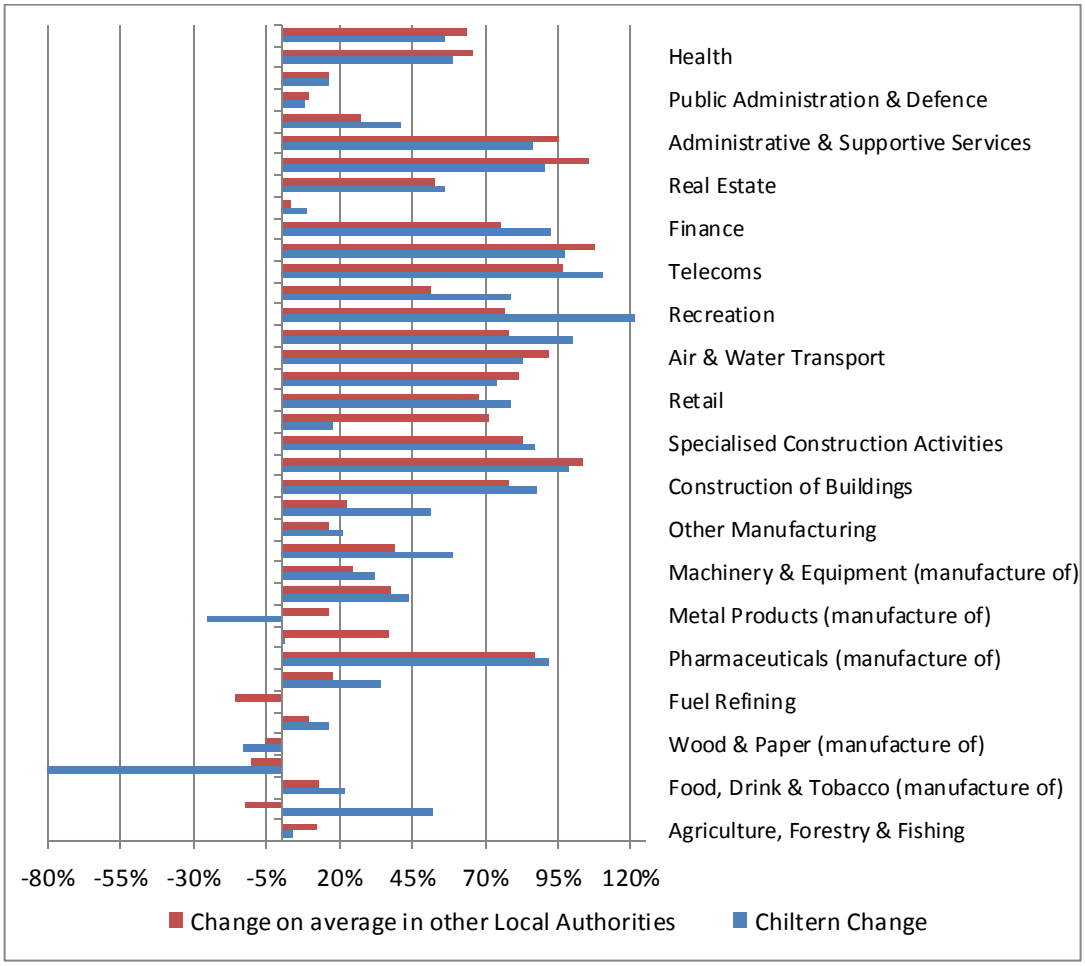
Source: Annual Population Survey 2013, Average House Prices courtesy of Land Registry.

In summary, the following conclusions can be drawn from the figures:

- In comparison to the other authorities, Chiltern district has a relatively smaller population. Only South Bucks district has a smaller population.
- House prices are significantly higher than the average, with only South Bucks district having higher house prices. Therefore, it is important to consider that the costs of HS2 are likely to have a greater effect on house prices in Chiltern district than in other locations.
- Productivity in Chiltern district is lower on average than the other local authorities. It should however be noted that the 'other authority' average is skewed by the inclusion of Hillingdon borough and Three Rivers district, which are either in or close to Greater London where productivity is higher.
- All areas are experiencing low unemployment. The rate of people claiming jobseekers allowance is on the whole marginally lower in Chiltern district than in the other local districts.
- Qualification attainment at Level three and Level 4 and above in Chiltern district is significantly greater than the comparative average for other areas.
- Analysis of the claimant count also shows that the proportion of unemployed searching for construction work is lower in Chiltern district in comparison to the other authorities. Again this means that the district is less likely to benefit from new construction job opportunities presented by the construction of HS2.

Comparing growth sectors, in terms of GVA, Chiltern district in comparison to the other authorities along the HS2 line reveals that Recreation is forecast to be a significant growth sector for the district. The HS2 could potentially undermine the performance and multiplier benefits of this opportunity sector for the district. The manufacture of metal products is forecast to fall significantly in the district (-25%) whereas, on average, in other locations this sector is forecast to grow (17%). Any benefits in supply chain related industries are therefore more likely to be felt elsewhere.

Figure A.12: Forecast GVA Change by Sector, 2013-2033



Source: Experian 2014

Summary overview of Chiltern district economy

Chiltern district is one of the most highly sought after locations to live in the UK. It is located close to London and residents enjoy a very high quality of life, benefiting particularly from the high quality natural environment within the AONB.

The area has benefitted from high levels of business start-ups over the years and notable knowledge based economy sectors have grown within the district, including an internationally renowned Life Sciences cluster. It is not surprising therefore to find that resident qualification attainment and wage levels are amongst the highest in the UK.

At the same time, tourism is a key component of the local economy. The area attracts millions of visitors each year, who enjoy walking, cycling and other outdoor activities. These visitors are attracted by the quality and tranquillity of the natural and historic environment. This sector is forecast to be a major growth sector, in term of GVA, over the next 20 years, although this could be undermined by HS2.

Closer analysis of the business structure reveals that there are relatively few businesses that could benefit from the construction phase of HS2. The construction sector itself is undeveloped compared to other areas on route and a large majority of businesses are classified as micro-businesses, with less than 10 employees, and are therefore unlikely to have the capacity to tender for HS2 contracts either directly or part of a consortium.

Appendix B Business Survey Questionnaire

Appendix C Value Transfer Approach

Value transfer involves taking economic value evidence estimated in one context (the 'study good' context) and using it in another (but similar) context (the 'policy good' context):

- The 'study good' (SG) is the good that has been valued by existing economic valuation studies;
- The 'policy good' (PG) is the good for which economic value evidence is required.

There are several approaches to value transfer. These differ in the degree of complexity, data requirements and expected reliability of the results. The two main variants of value transfer are: (i) unit value transfer; and (ii) value function transfer:

- **Unit value transfer**: this may involve either the transfer of *unadjusted* values, or the transfer of *adjusted* values to estimate the value of the change in the provision of the policy good:

Unadjusted unit value transfer: ***unit value PG = unit value SG***

[e.g. £/household/year for PG = £/household/year for SG]

Adjusted unit value transfer: ***unit value PG = adjustment factor × unit value SG***

[e.g. £/household/year for PG = a × £/household/year for SG]

Adjustments to transferred values are based on empirical evidence and control for differences between the policy good context and the study good context that cause the unit value to differ between the two contexts.

- **Value function transfer:** The 'value function' estimated for the study good is used to estimate the value of the change in the provision of the policy good:

Factors determining the value of PG = Factors determining the value of SG

[e.g. £/household/year for PG = $f(X_{PG})$ = $f(X_{SG})$]

Where *f* is function and *X* is the set of factors (related to the good, the change, and the affected human population) that are found to influence the value of the study good.

The choice of value transfer approach to use will depend on a number of considerations including the available economic valuation evidence and other evidence to support the analysis, time and resources available to the analyst and the requirements of the decision-context.