

# Long Term Sectoral, Employment and Land Use Projections

Report prepared for  
Northumberland County Council

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10 June 2014



## **Executive Summary**

### ***Background and Introduction***

This study updates a similar study that was undertaken for the Council in early 2010<sup>1</sup>. It presents four scenarios for projected economic change over the 20 year period from 2011 to 2031. Each scenario comprises projections of gross value added (GVA) and employment. The employment projections have been converted to projections of demand for employment floorspace and land. These physical requirements are particularly important to the County Council in the context of producing its development plan.

Economic data for Northumberland were purchased from Cambridge Econometrics (CE). These data divide the economy into 45 different sectors and comprise projections of annual levels of GVA and employment in each sector for the period to 2031 and form the basis of a Baseline Scenario. CE's GVA projections are used directly in the baseline, whilst those for employment have been translated into employee headcounts and full-time equivalents (FTE). The long term rate of economic growth (i.e. GVA growth) for the County in the Baseline Scenario is 1.7% pa. This is lower than the equivalent value of 2% used in the 2010 study. It is also lower than CE's projections of 1.8% pa for the North East and 2.0% pa for the UK economy though these projections are reflective of the relative performance at county, regional and national in recent years.

Lower and Upper Scenarios have been developed from the Baseline Scenario by adjusting the long run rates of employment growth, downwards by 0.1 percentage points and upwards by 0.2 points, respectively. These two additional scenarios reflect the inherent uncertainty in any long term projection, particularly at the present time when there is uncertainty about the speed of economic recovery and long term growth rates. There is evidence to suggest that the CE projections may be on the cautious side and the asymmetric nature of the growth adjustments reflects this view.

The Lower and Upper Scenarios respectively adopt more pessimistic and optimistic views for future growth. The effects are evenly spread across the economy and avoid the need to assume that some sectors are more resilient than others (in the pessimistic case) or better able to grasp opportunities (in the optimistic case). This contrasts with the fourth scenario, called the Policy Scenario, where some sectors are subjected to higher rates of growth, beyond those of the Upper scenario. The sectors were selected following an analysis undertaken by Council Officers of economic development plans at national, regional and County level. The Policy Scenario is based on the relatively benign outlook of the Upper Scenario, coupled with a view that the various policy initiatives set out in the plans will have a long term effect on specific sectors. Long term rates of economic growth in the Lower, Upper and Policy Scenarios are 1.5% pa, 1.9% pa and 1.95%pa, respectively.

### ***Northumberland's Economy***

For reporting purposes CE's 45 sectors have been grouped into 13 broader sectors which are broadly comparable to the 2010 study. Employment levels across these sectors are shown in the table below for 2012.

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<sup>1</sup> Hunt A, Stone IE, Hewitt J (April 2010) *Long Term Sectoral and Employment Projections for Northumberland* Northumberland Infonet Working Paper 126  
Hunt A (April 2010) *Long Term Sectoral and Employment Projections for Northumberland – Employment Land Annex*

## Number of Employees by Sector 2012

Sector	Headcount Employment (000s) <sup>2</sup>	Percentage of Headcount Employment
Agriculture, Forestry and Fishing <sup>3</sup>	0.3	0.3%
Energy, Water, Quarrying and Waste	1.9	2.0%
Manufacturing 1	9.0	9.1%
Manufacturing 2	2.2	2.2%
Construction	6.7	6.8%
Wholesale and retail trade	15.4	15.7%
Hotels, restaurants and recreation	14.3	14.5%
Transport	2.6	2.7%
Information and Communication	1.1	1.1%
Finance	1.1	1.1%
Business Services	10.7	10.8%
Public Services	31.6	32.0%
Other services	1.6	1.6%
<b>Total</b>	<b>98.5</b>	<b>100.0%</b>

Northumberland's economy is dominated by service sectors. These account for 80% of the County's jobs. *Public Services* is the largest sector at over 30% of all jobs. The *Wholesale and Retail Trade* and *Hotels, Restaurants and Recreation* are also large service sectors accounting for a further 30% of jobs, whilst *Business Services* adds over 10% more. The remaining service sectors (*Transport, Information and Communication, Finance* and *Other Services*) are all small. The two *manufacturing* sectors account for around 11%. *Manufacturing 2* represents more advanced sectors whilst *Manufacturing 1* comprises more traditional and general categories. The remaining jobs are, in decreasing order of size, divided between *Construction; Energy, Water, Quarrying and Waste; and Agriculture, Forestry and Fishing*.

### Employment Projections

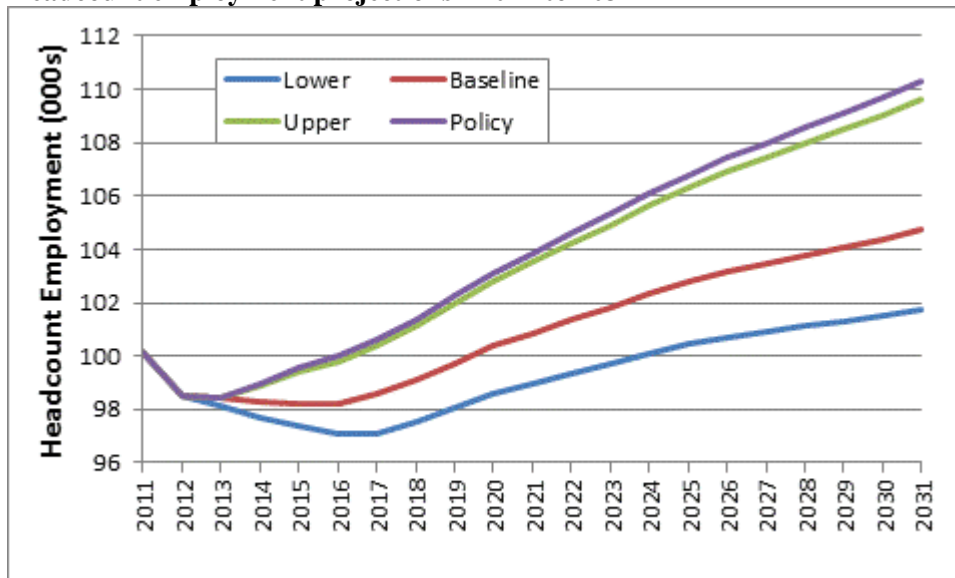
Measured on a workplace basis, headcount employment in Northumberland declined between 2011 and 2012 by around 1,600 jobs or 1.5%. The Baseline Scenario, projects a further loss of around 300 jobs in the years to 2016. These losses are followed by steady employment growth in subsequent years and, in round terms, Northumberland's headcount employment increases overall by 5% from around 101,100 in 2011 to 104,700 in 2031. Over this period, employment within *Service activities*, grows by 9%, nearly twice as fast as in the economy as a whole, increasing its share of overall employment in 2031. *Manufacturing* declines by over one-fifth (around 2,500 jobs) over the 20 years, whilst employment in the remaining sectors is broadly unchanged.

The chart below shows the overall headcount employment projections for all four scenarios. The picture for FTE employment is not shown and is broadly similar, though with a general reduction in growth rates and a sharper reduction of 2.5% between 2011 and 2012. The former is due to a general trend projected across all sectors in reduced average hours of working, caused by decreasing levels of overtime in some sectors and increases in part-time working in others. These general reductions mean whilst headcount employment shown in the chart grows by around 4,600 jobs between 2011 and 2016 in the Lower Scenario, there is no growth when the measurement is on an FTE basis. The reductions in the other scenarios are similar. The sharper reduction in FTE between 2011 and 2012 is due to mix effects.

<sup>2</sup> Full and part time employees are given equal weight in this column. Figures largely exclude self-employment.

<sup>3</sup> Figures exclude Farm Agriculture (SIC subclass 01000)

## Headcount employment projections - 2011 to 2031



In 2031, the Lower Scenario projects a headcount employment in 2031 that is 3,000 lower than the Baseline Scenario. The Upper Scenario projects 2031 values that are 4,900 higher than the Baseline. The Policy Scenario adds a further difference of around 700, bringing the overall difference from the Baseline to around 5,600. In the Upper and Lower Scenarios, differences from the Baseline are contributed in proportion to the levels of employment within each sector. In consequence, the differences between the scenarios are largely contributed by the dominant sectors: *Public Services; Hotels, restaurants and recreation; Wholesale and retail trade; and Business services*. Collectively, these sectors account for three-quarters of the overall difference from the Baseline Scenario in each case.

The additional 700 headcount jobs added to the Upper Scenario by the Policy Scenario are contributed differently. *Business Services* and *Hotels, restaurants and recreation* contribute almost half the additional number, whilst the two *Manufacturing* sectors, *Construction* and *Wholesale and retail trade* contribute a further 40%.

In FTE terms, the differences from the Baseline Scenario in 2031 are around 2,500 less in the Lower Scenario and 4,100 and 4,700 more for the Upper and Policy Scenarios, respectively.

### ***Employment Floorspace and Land Projections***

This study has aimed to use the same relationships employed in the 2010 study between economic sectors and the planning system's use classes. The conversion of jobs uses density factors to measure the amount of floorspace (in sq m.) and land requirement (in ha) required per employee. This differs across use classes and follows guidance produced by the Homes and Communities Agency HCA.

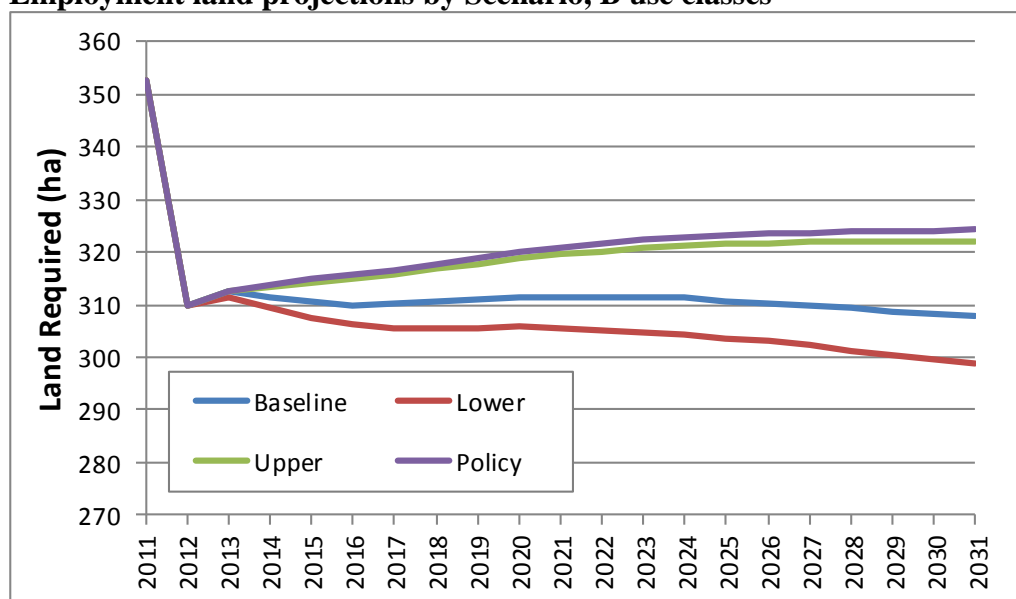
The employment land projections for the B category use classes are shown in the tables below for the Baseline Scenario and across all four scenarios in the chart.

### Employment land projections, Baseline Scenario, B use classes

Use Class	2011	2016	2021	2026	2031	Net Change 2011-31
B1a	60.5	58.5	60.9	62.5	63.9	3.4
B1b	2.4	2.8	2.9	3.0	3.1	0.7
B1c	15.5	14.6	14.9	14.6	14.1	-1.4
B2	133.1	116.3	112.5	108.7	104.7	-28.3
B8	141.1	117.8	120.3	121.6	121.8	-19.3
<b>Total</b>	<b>352.6</b>	<b>310.0</b>	<b>311.4</b>	<b>310.4</b>	<b>307.7</b>	<b>-44.9</b>

Units: ha

### Employment land projections by Scenario, B use classes



The projections for floorspace in the four scenarios (not shown here) are broadly similar to those shown in the chart for employment land, though with slightly higher rates of growth. The chart shows a very sharp downturn of 12% in demand for employment land between 2011 and 2012. This is considerably more severe than the reductions in employment noted earlier. There two reasons for this. First, at 7.5%, employment in the B category use classes contracted considerably more than in the economy as a whole. Second, within the B category use classes, the reductions in employment falling within the B2 (factories) and B8 (warehouses) were considerably higher. Since, these two use classes have considerably higher land requirements per employee than the B1 classes, this further amplifies the reduction in land required.

In the years from 2013, the land requirements show a small decline in both the Baseline and Lower Scenarios, equivalent to 1% and 2%, respectively over the subsequent 3-4 years. Beyond this the Baseline Scenario increases before tailing off again. Compared to 2014, and therefore to estimates of current land requirements, values are 1% lower in 2031 in the Baseline Scenario. For the Lower scenario the corresponding figure is 3% lower for land. The Upper and Policy Scenarios each show modest and steady increases in the land projections, with 2031 values 3-3½% above 2014 values.

Changes in the projected land requirements between 2014 and 2031 are set out in the final table overleaf. This provides an estimate of demand from the present time to the end of the projection horizon in 2031.

**Employment Land Projections By Scenario  
Changes between 2014 and 2031**

Use Class	Scenario			
	Baseline	Lower	Upper	Policy
B1a	5.1	3.6	7.7	8.1
B1b	0.3	0.3	0.5	0.5
B1c	-0.3	-0.6	0.3	0.4
B2	-13.3	-15.6	-9.1	-8.2
B8	4.4	1.7	9.4	9.9
<b>Total</b>	<b>-3.7</b>	<b>-10.7</b>	<b>8.8</b>	<b>10.8</b>

*Units: ha*

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## 1. Introduction

The study presented in this report was commissioned by Northumberland County Council to provide information and evidence for informing the Council in the development of its Local Plan. The report contains long term economic projections for different sectors within Northumberland's economy covering the period to 2031.

The present study broadly updates a similar study that was undertaken for the Council in early 2010. Like the earlier study and its reports<sup>4</sup>, this study presents several scenarios for projected economic change. Each scenario comprises projections of gross value added (GVA)<sup>5</sup> and employment. As with the previous study, the employment projections have been converted to projections of demand for employment floorspace and land. These projections of physical requirements are particularly important in the context of developing the Local Plan.

This and the 2010 study have been undertaken by the Policy Research Group (PRG) at St.Chad's College, Durham University. As far as practicable, the present study has adopted the assumptions and methods underlying the previous study. Where such differences arise, these are noted in the relevant places within this report.

PRG comprises a number of academics, researchers and associates. It undertakes high quality independent research to support public policy development and implementation. Commissioners of the group's research include government departments and agencies, local authorities, charitable trusts and social enterprise groups. Regional development forms one of PRG's principal research areas and the group previously developed the bespoke model of the North East's economy known as NEEM (North East Economic Model).

### 1.1. Structure of this Report

This report is presented in 5 sections. Section 2 provides two main pieces of background material. Section 2.1 covers some of the methodological aspects of the present study, including a brief discussion of the difference between forecasts and projections and disparities with the previous study. Section 2.2 aims to set the context for the projections with a brief comparison of Northumberland's recent economic growth with that of the North East Region and the UK as a whole.

Section 3 presents the baseline economic projections. These projections cover both GVA and employment and cover the period from 2011 to 2031. The baseline projections form a basis from which three alternative sets of projections have been developed. These alternatives are presented in Section 4, where the main focus is on employment. Section 5, presents projections of the employment floorspace and employment land required to meet the levels of employment projected across all the scenarios presented in Sections 3 and 4.

Production of the projections contained within this report was the purpose of the present study. The report does not contain any conclusions or recommendations within its main body or as separate sections of the report.

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<sup>4</sup> Hunt A, Stone IE, Hewitt J (April 2010) *Long Term Sectoral and Employment Projections for Northumberland* Northumberland Infonet Working Paper 126

Hunt A (April 2010) *Long Term Sectoral and Employment Projections for Northumberland – Employment Land Annex*

<sup>5</sup> GVA is a measure of the economic activity within an area. In broad terms it comprises the sum of employment costs (wages and other employee related costs such as employers national insurance and pension contributions) and company profits.



## **2. Background**

### **2.1. Methodology**

#### *Development of Scenarios*

This report is based on 4 scenarios. The first of these acts as a baseline and is called the Baseline Scenario. Employment and GVA projections for this scenario were supplied by Cambridge Econometrics (CE), an economics consultancy. CE's projections were the latest available at the time the study was undertaken and are dated November 2013. The projections divide the economy into 45 sectors which are detailed in Appendix 1.

The remaining three scenarios are all derived from the Baseline Scenario. Upper and Lower Scenarios, respectively represent faster and slower rates of economic recovery with higher and lower long term rates of growth prevailing. The fourth scenario is a bespoke scenario based on the Upper Scenario and involves higher rates of growth in specific sectors. These sectors have been chosen to reflect priorities for economic development at national, regional and county level. Broadly, this fourth scenario is intended to reflect a relatively buoyant long term economic outlook for Northumberland, in which policies designed to assist important sectors of the County's economy prove successful. It is referred to as the Policy Scenario in the remainder of this report.

#### *Projections vs Forecasts*

The future values contained within this report are projections rather than forecasts. The difference between a projection and a forecast is a subtle one. Both provide estimates of a future value but differ in the assumptions on which they are based. A projection may be based on any relevant assumption - for example, that manufacturing will increase its share of Northumberland's economy by 20% over the next 10 years. Such assumptions need to be realistic for the projection to hold value. A forecast eliminates such assumptions in favour of values that are expected or most likely to occur, perhaps based on an analysis of past trends. However, the accuracy of most forecasts declines with distance into the future. This is particularly true for economic forecasts.

#### *Differences from the 2010 Study*

In methodological terms, the present study has adopted much from the 2010 study. The main differences relate to the source of the Baseline Scenario and the sectoral representation of the economy.

In the 2010 study, the Central Scenario, which is equivalent to the Baseline Scenario in the present study, was based on long term economic projections from the National Institute of Economic and Social Research (NIESR). The projections divided the economy into just two very broad sectors: services and non-services. Bespoke time-series modelling was then used within the study to derive projections for 26 detailed sectors falling within NIESR's two broad sectors. The projections from this bespoke modelling were constructed to be consistent with the NIESR projections. This bespoke modelling effectively "coloured-in" the sectoral details embedded within but not explicitly provided by NIESR's projections. In contrast, the Baseline Scenario in the present study is based on projections provided by CE. No bespoke modelling is required since the projections provided separate values for each of 45 detailed sectors of the economy.

Both CE and NIESR are amongst leading and well-respected organisations in the supply of data for economic modelling. Data from both organisations has been widely used for the production of employment projections for plan making. Neither organisation is noted for leaning towards the production of optimistic or pessimistic projections. For the economy as a whole, the projections of the previous study can reasonably be compared to those of the present study. At a detailed sector level, comparisons may be limited for the reasons set out below.

The results of the 2010 study were mainly reported by dividing the economy into 12 sectors, though much of the analysis in the study was based on a more detailed but consistent set of 26 sectors which had been

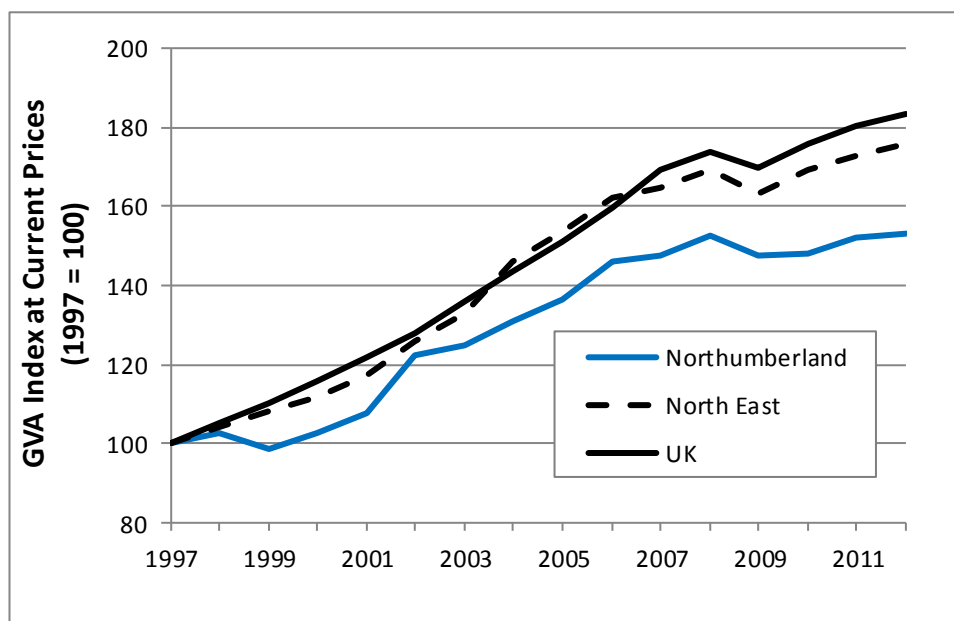
previously used by the Regional Development Agency, One North East. Both the 12 and 26 sector sets are themselves based on the Standard Industrial Classification (SIC). This is a system for classifying the activities of workplaces used by the Office for National Statistics (ONS). This classification system is periodically updated and underwent a major revision in 2007. ONS subsequently adopted this revised version which is called SIC 2007. The preceding version, on which the 12 and 26 sectors of the previous study are based is called SIC 2003. CE, like most economic forecasters has now adopted SIC 2007, and in consequence CE's 45 sectors are based on SIC 2007.

The relationship between SIC 2003 and SIC 2007 is a complex one. As a result, there is no straightforward way of mapping the data available for the present study (based on CE's 45 sectors) onto the previous study's 12 sectors. Following discussion with Council staff it was agreed that, within this report, the economy would be divided into 13 sectors for reporting purposes. Whilst most of these sectors share names with the sectors of the previous study, it does not follow that they are identically defined. As a result, the projections for a sector in the previous study may not be strictly comparable with an identically named sector in this report. Further details about the differences between SIC 2003 and SIC 2007 and the definitions of sectors used in this report can be found in Appendix 1.

## 2.2. Northumberland's Economy in Context

In 2012, the most recent year for which data are available, GVA in Northumberland was £3.8bn and represented about 9% of the total for the North East. Northumberland's economy has grown more slowly than the national and regional economies in recent years, Figure 1, below, shows the relative performance over the 15 years from 1997 to 2012 for Northumberland, the North East and the UK. An index value, set at 100 in 1997, is used to facilitate the comparison between the three different sized areas.

**Figure 1: Economic Performance – Northumberland, North East and UK**



Current price index values, 1997=100.  
Source: ONS (Regional Accounts)

The data are shown in current price terms and some of the upward trends are due to inflation. The data show that over the period the County has grown at around two-thirds the rate of the two benchmarks. Of particular note is the County's relatively slow rate of recovery from the low point of 2009. For 2012, GVA shows an increase of 8.0% and 7.7% over 2009 levels at national and regional level, respectively. The corresponding increase for Northumberland is much lower at only 3.6%.

In terms of employment, service sectors and in particular *Public Services* dominate. Table 1 below, shows the percentage of employment in 2012 (the latest year available) for the 13 reporting sectors<sup>6</sup>.

**Table 1: Percentage of Jobs by Sector, 2012**

<b>Sector</b>	<b>Headcount Employment (000s)<sup>7</sup></b>	<b>Percentage of Headcount Employment</b>
Agriculture, Forestry and Fishing <sup>8</sup>	0.3	0.3%
Energy, Water, Quarrying and Waste	1.9	2.0%
Manufacturing 1	9.0	9.1%
Manufacturing 2	2.2	2.2%
Construction	6.7	6.8%
Wholesale and retail trade	15.4	15.7%
Hotels, restaurants and recreation	14.3	14.5%
Transport	2.6	2.7%
Information and Communication	1.1	1.1%
Finance	1.1	1.1%
Business Services	10.7	10.8%
Public Services	31.6	32.0%
Other services	1.6	1.6%
<b>Total</b>	<b>98.5</b>	<b>100.0%</b>

Source: ONS (BRES<sup>9</sup>)

*Service activities* account for 80% of the County's jobs. *Public Services* is the largest sector at over 30% of all jobs. The *Wholesale and Retail Trade* and *Hotels, Restaurants and Recreation* are also large service sectors accounting for a further 30% of jobs, whilst *Business Services* adds over 10% more. The remaining service sectors (*Transport, Information and Communication, Finance* and *Other Services*) are all small. The two *manufacturing* sectors account for around 11%. *Manufacturing 2* comprises SIC 2007 Divisions 26, 27, 29 and 31-33 (see Appendix 1 for definitions) and is intended to represent more advanced sectors. *Manufacturing 1* comprises all other SIC divisions in the range 10-28, except for division 19 (*Manufacture of coke and refined petroleum products*) which is classed as part of *Energy, Water, Quarrying and Waste*. The remaining jobs are, in decreasing order of size, divided between *Construction; Energy, Water, Quarrying and Waste; and Agriculture, Forestry and Fishing*.

### 3. Baseline Scenario

#### 3.1. GVA Projections

The Baseline Scenario is provided directly by the projections obtained from Cambridge Econometrics (CE). In addition to providing the projections for Northumberland, CE also provided comparative projections for the North East and the UK. The total GVA projected for each area is illustrated in Figure 2, below. As with the earlier historic data shown in Figure 1, an index value has been used to enable comparison across different sized geographies. For the projections the index value is set to 100 in 2011.

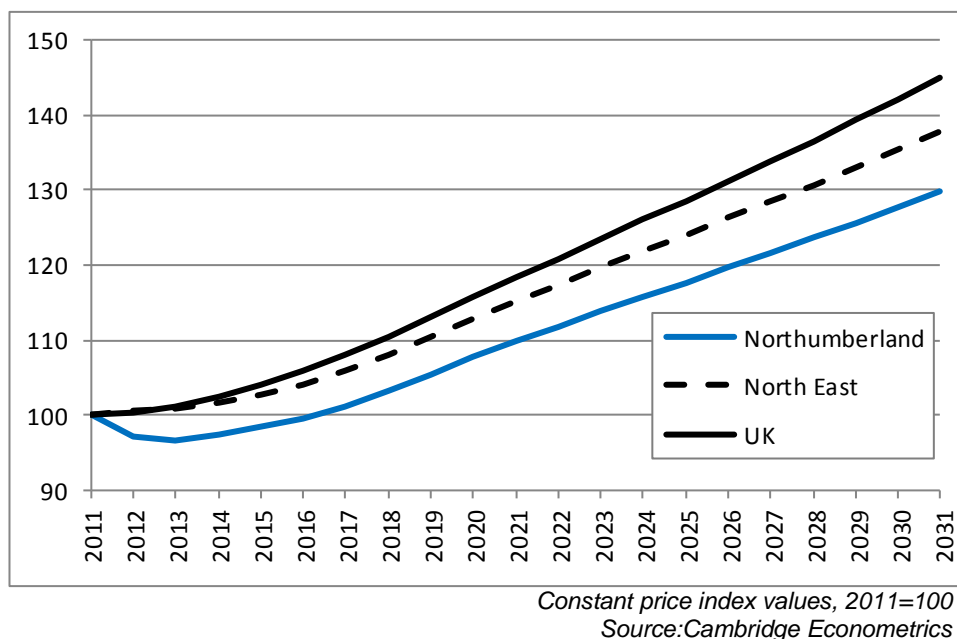
<sup>6</sup> Definitions of these sectors are contained within Appendix 1.

<sup>7</sup> Full and part time employees are given equal weight in this column. Figures largely exclude self-employment.

<sup>8</sup> Figures exclude Farm Agriculture (SIC subclass 01000)

<sup>9</sup> BRES is the Business Register and Employment Survey. It is ONS' recommended source of information on employment by detailed geography and industry.

**Figure 2: GVA projections - Northumberland, North East and UK**



The projections for Northumberland show a decline in GVA in 2011 and 2012. This appears to contradict the earlier picture shown in Figure 1. This matter can be resolved by noting that the measures of GVA differ in the two charts. The historic data in Figure 1 are on a current price basis and annual changes in these data include the effects of price inflation in the economy. In contrast, the projections in Figure 2 are on a constant price basis and exclude inflation effects. Because inflation is generally positive, GVA growth measured in constant price terms will be numerically lower than its current price equivalent.

Once the differences between current and constant prices are taken into account the relative patterns of growth shown in Figure 2 for the initial period of 2011 to 2013 are entirely consistent with the patterns previously noted for Figure 1 and the period of 2009 to 2012.

Over the longer term, the projections continue the historic trend of lower growth in Northumberland. For the period of positive constant price growth from 2013 onwards, Northumberland's economy is projected to grow at an average annual rate of 1.7% pa compared to 1.8% regionally and 2.0% nationally. This long term growth rate is considerably lower than that adopted in the 2010 study of 2% per annum.

At sector level, the projections for Northumberland are shown below at 5-yearly intervals in Table 2. The values are in £m at 2009 constant prices. Also shown in the final column is the overall percentage change for each sector over the 20 year period from 2011 to 2031.

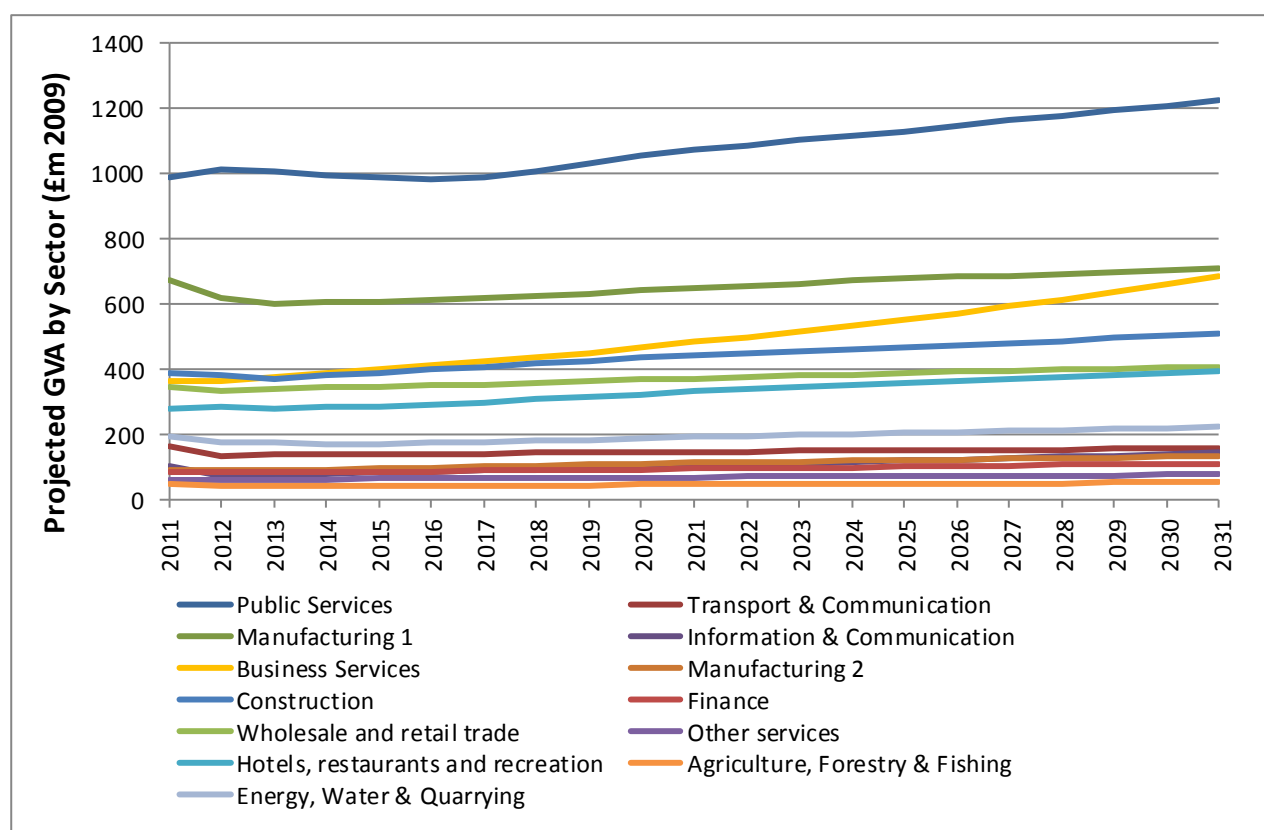
**Table 2: GVA Projections by Sector (2009 £m)**

Sector	2011	2016	2021	2026	2031	Change 2011-31
Agriculture, Forestry and Fishing	49.1	44.6	47.6	51.1	53.4	9%
Energy, Water, Quarrying and Waste	192.4	174.8	192.2	207.9	222.2	15%
Manufacturing 1	675.5	615.1	649.7	683.0	708.2	5%
Manufacturing 2	91.2	99.8	113.5	123.8	133.4	46%
Construction	389.9	400.4	441.8	474.9	509.8	31%
Wholesale and retail trade	347.0	351.0	373.7	392.8	409.6	18%
Hotels, restaurants and recreation	277.2	293.9	332.8	365.6	392.7	42%
Transport	162.5	141.3	148.2	153.2	157.8	-3%
Information and Communication	102.6	86.4	104.6	124.0	145.7	42%
Finance	83.3	88.7	95.7	103.8	112.7	35%
Business Services	366.7	411.2	483.3	573.8	684.1	87%
Public Services	988.5	981.9	1072.3	1146.9	1224.6	24%
Other services	61.2	65.6	69.9	73.9	77.6	27%
<b>All Sectors</b>	<b>3787.1</b>	<b>3754.6</b>	<b>4125.2</b>	<b>4474.7</b>	<b>4831.7</b>	<b>28%</b>

Source: Cambridge Econometrics

These projections are also shown in chart format in Figure 3, below.

**Figure 3: GVA Projections by Sector (2009 £m)**



Source: Cambridge Econometrics

To aid interpretation of Figure 3 the 13 sectors are listed in the key in descending order of GVA value in 2031 – i.e. *Public Services* has the highest level of GVA in this year, followed by *Manufacturing 1* and ending with *Agriculture Forestry & Fishing* which has the lowest GVA level of the 13 sectors in 2031.

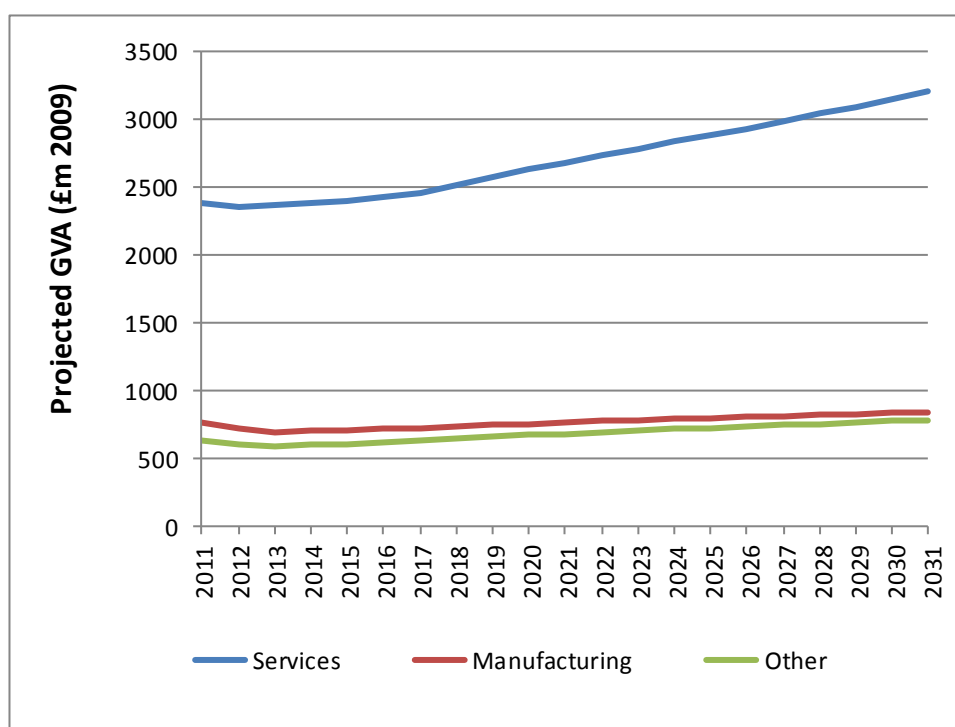
Table 3 and Figure 4 present the same information but aggregated into 3 very broad sectors and showing each as a percentage of the annual total.

**Table 3: GVA Projections by Broad Sector (2009 £m)**

Broad Sector <sup>10</sup>	2011	2016	2021	2026	2031	Change 2011-31
Services	2389.0 63.1%	2420.0 64.5%	2680.3 65.0%	2933.9 65.6%	3204.8 66.3%	34%
Manufacturing	766.7 20.2%	714.8 19.0%	763.2 18.5%	806.8 18.0%	841.5 17.4%	10%
Other	631.4 16.7%	619.7 16.5%	681.7 16.5%	733.9 16.4%	785.4 16.3%	24%
<b>All sectors</b>	<b>3787.1</b> <b>100.0%</b>	<b>3754.6</b> <b>100.0%</b>	<b>4125.2</b> <b>100.0%</b>	<b>4474.7</b> <b>100.0%</b>	<b>4831.7</b> <b>100.0%</b>	<b>28%</b>

Source: Cambridge Econometrics

**Figure 4: GVA Projections by Broad Sector (2009 £m)**



Source: Cambridge Econometrics

Historic trends evident at national, regional and county levels are set to continue within the projections of the Baseline Scenario. *Services*' share of the economy is projected to increase steadily. Although the *Manufacturing* and *Other* sectors show growth over the period, their levels of growth at 10% and 24% respectively are below the 34% growth associated with *Services* over the 20 year period. In consequence, the *Manufacturing* and *Other* sectors continue to reduce as a proportion of the overall economy.

<sup>10</sup> The broad sectors are defined as follows. *Services* comprises the 8 sectors in Table 2 between *Wholesale and Retail Trade* and *Other services*, inclusive. *Manufacturing* comprises *Manufacturing 1* and *Manufacturing 2*. *Other* comprises the remain 3 sectors of (i) *Agriculture, Forestry and Fishing*, (ii) *Energy, Water, Quarrying and Waste* and (iii) *Construction*.

Within *Services*, the sectors with higher than average growth are *Business Services*, *Hotels, Restaurants and Recreation* and *Information and Communication*. Growth in *Business Services* is projected to be particularly rapid. The sector is projected to grow by nearly 90% to increase the sector's share of Northumberland's GVA from 10% of the economy in 2011 to 14% 2031. The remaining *Services* sectors except *Finance* grow at rates below the *Services* average of 34% over the 20 year period. *Finance* is projected to grow by 35%, very similar to the *Services* average. *Transport* is projected to contract sharply in the initial part of the projection horizon and despite subsequent growth it still remains below 2011 levels by 2031. *Wholesale and Retail Trade* growth is also low at 18% for the 20-year period and lower than the growth of 28% across all sectors of the economy. *Public Services* growth is 24% and marginally below that of the economy as a whole.

In *Manufacturing*, lower rates of growth are projected in the more traditional and lower technology sectors of *Manufacturing 1*, which is projected to grow by just 5% over the 20 year period. In contrast, the more advanced and higher technology sectors of *Manufacturing 2*, have a projection that increases GVA by 46% over the period. However, the relative sizes of these two sectors means that it is the effect of the former that dominates. The projection for *Manufacturing* as a whole is for just 10% growth over the 20 years.

### 3.2. Employment Projections

Like the 2010 study, two measures of employment are reported here: full-time equivalents (FTE) and headcount. The former provides a measure of comparability across different sectors and is based on a working week of 37 hours for 48 weeks of the year. The latter gives equal weight to full-time and part-time jobs. As with the earlier study, both measures largely exclude self-employment and apply to employment within Northumberland (*workplace basis*) rather than the employment of residents living in Northumberland (*residence basis*).

In Northumberland's context, self-employment is important and accounts for around 17% of employment compared to 14% nationally and 11% for the North East as a whole.<sup>11</sup> Although the CE projections include self-employment, adjustments have been made to these projections which largely exclude self-employment<sup>12</sup>. There are two main reasons for this. The first is compatibility with the previous study. The second is that the excluded self-employed are unregistered with HMRC for both VAT and the operation of PAYE and so have low turnover and do not employ others. In the absence of specific evidence to suggest otherwise, it seems unlikely that this class of self-employed persons will generate requirements for employment space such as offices and workshops at rates comparable to those of employees.

Employment is on a workplace basis rather than residence basis again for compatibility with the previous study and the CE projections are provided on this basis. It is important to note that Northumberland is a net exporter of commuters<sup>13</sup> and, therefore, that employment levels for Northumberland's residents are higher than reported here. Figure 5, below, shows the headline projections for both headcount and FTE.

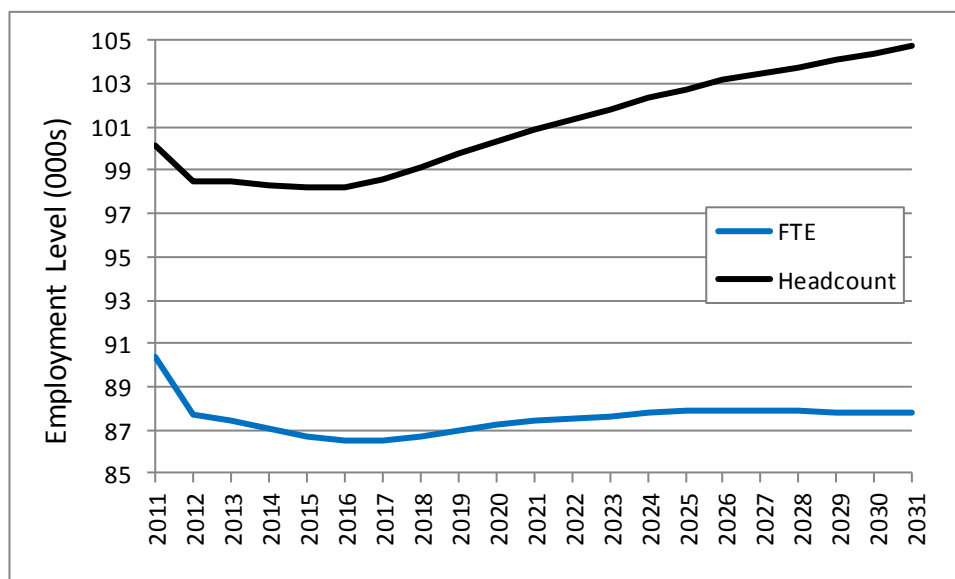
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<sup>11</sup> Source: NOMIS (www.nomisweb.co.uk), *Annual Population Survey – Workplace Analysis*

<sup>12</sup> The adjustments put the CE projections onto the same basis as the Employment derived by ONS from BRES.

<sup>13</sup> Travel data from the 2001 Census (the latest for which published values are available) suggests that around 15% of Northumberland's workforce is made up of in-commuters and that for every 2 in-commuters there are 5 Northumberland residents who commute outside the County for employment [source: NOMIS 2001 Census – UK Travel Flows (local authority)]

**Figure 5: Employment Projections**



Source: Durham University/Cambridge Econometrics

Both measures of employment show a sharp decline in employment between 2011 and 2012 with further declines in the years to 2016. The reduction in FTE between 2011 and 2012 is around 2,650 and, due to mix effects, is more severe than that for headcount at around 1,600. Headcount shows a much gentler decline between 2012 and 2016 of less than 300 compared to over 1,200 FTE. Beyond 2016, both measures show some growth. The FTE series attains its 2012 level in 2026 and thereafter remains fairly stable. The Headcount series shows a much greater rate of growth and, in round terms increases from 100,100 in 2011 to 104,700 by 2031. The numerical values underlying the lines in the chart are shown in the final rows of Table 4 (for FTE) and Table 5 (for Headcount).

Comparison of Northumberland’s employment projections with the earlier GVA projections in Section 3.1 indicates that GVA grows much more rapidly than employment. Between 2011 and 2031, GVA grows by 28% (see Table 2) whilst Headcount grows by only 5% (see Table 5) and FTE shrinks by 3% (Table 4). The explanation for these differences lies in the economic concept of *productivity*.

Productivity is the amount of GVA generated per job. Productivity tends to increase over time in response to a variety of factors such as competition, process improvements and technology. The CE projections indicate that in terms of 2009 prices, Northumberland’s productivity grows from £32,700 of GVA per job<sup>14</sup> in 2011 to £40,500 in 2031, an increase of 24%. Thus over the period as a whole, productivity growth accounts for most of the growth in GVA of 28%. GVA growth is simply the product of productivity growth and employment growth<sup>15</sup> and typically productivity growth is responsible for the vast majority of GVA growth. Over short term periods, productivity growth means it is possible for GVA to grow whilst employment shrinks and this effect is evident in the projections for Northumberland between 2013 and 2016.

Projected FTE’s “bottom out” later than GVA (see Figure 2) because, across the economy as a whole, improvements in productivity are outstripping the low levels of GVA growth in the period from 2014 to 2016. From 2017 to 2025 GVA growth is sufficiently improved so that it slightly exceeds productivity growth resulting in the weak growth in FTEs, showing in Figure 5. Beyond this, there is a slowing down of GVA growth in CE’s projections with the net effect that FTE growth reduces to zero.

<sup>14</sup> The CE productivity values quoted include self-employment

<sup>15</sup> Mathematically the relationship is  $(1 + \text{GVA Growth}) = (1 + \text{Productivity Growth}) \times (1 + \text{Employment Growth})$ , where the growth values are expressed as proportions (eg 0.25 for 25%).



At broad sector level, Table 4 shows the projections for the FTE measure whilst Table 5 presents the Headcount projections of the Baseline Scenario. Both tables have adopted the format of the earlier Table 3 for GVA with which they can be compared. The tables show for each broad sector: projected values at 5 year intervals; percentage change in employment over the 20 years between 2011 and 2031; and the percentages of employment in each sector.

**Table 4: FTE Projections by Broad Sector (000s)**

<b>Broad Sector</b>	<b>2011</b>	<b>2016</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>	<b>Change 2011-31</b>
Services	66.2 73%	65.3 76%	66.7 76%	67.8 77%	68.3 78%	3%
Manufacturing	12.4 14%	10.6 12%	10.0 11%	9.4 11%	8.8 10%	-29%
Other	11.8 13%	10.5 12%	10.7 12%	10.8 12%	10.7 12%	-9%
<b>All sectors</b>	<b>90.4</b> <b>100%</b>	<b>86.5</b> <b>100%</b>	<b>87.4</b> <b>100%</b>	<b>87.9</b> <b>100%</b>	<b>87.8</b> <b>100%</b>	<b>-3%</b>

Source:Durham University/Cambridge Econometrics

**Table 5: Headcount Projections by Broad Sector (000s)**

<b>Broad Sector</b>	<b>2011</b>	<b>2016</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>	<b>Change 2011-31</b>
Services	78.4 78%	78.7 80%	81.3 81%	83.7 81%	85.5 82%	9%
Manufacturing	11.3 11%	10.0 10%	9.6 10%	9.2 9%	8.8 8%	-22%
Other	10.4 10%	9.6 10%	10.0 10%	10.2 10%	10.4 10%	0%
<b>All sectors</b>	<b>100.1</b> <b>100%</b>	<b>98.2</b> <b>100%</b>	<b>100.9</b> <b>100%</b>	<b>103.1</b> <b>100%</b>	<b>104.7</b> <b>100%</b>	<b>5%</b>

Source:Durham University/Cambridge Econometrics

Over the twenty year period, headcount employment within *Service activities* grows by 9%, nearly twice as fast as in the economy as a whole, increasing the broad sector's share of overall employment in 2031. *Services* also increases its share when measured on an FTE basis. *Manufacturing* declines by over one-fifth (around 2,500 jobs) in headcount terms and by nearly 30% in FTE over the period. Employment in the *Other* sectors is broadly unchanged in headcount terms but reduces by 10% in FTE.

It is no coincidence that the changes over the period 2011 to 2031 shown in the final column of each table are persistently lower on the FTE measure. The ratio of headcount to FTE is generally projected to increase in all sectors and provides some explanation of why headcount employment grows more quickly and declines more slowly than FTE employment in Figure 5. This ratio is related to average hours of working and increases as the proportion of part-time jobs increases and levels of overtime decrease. The effect can be seen clearly in the case of the broad *Other* sector. Over the 20 year period FTE employment is projected to decline whilst headcount remains unchanged. Effectively, the number of jobs is unchanged but average hours of work will be reduced in 2031, thereby reducing the level of employment on an FTE basis.

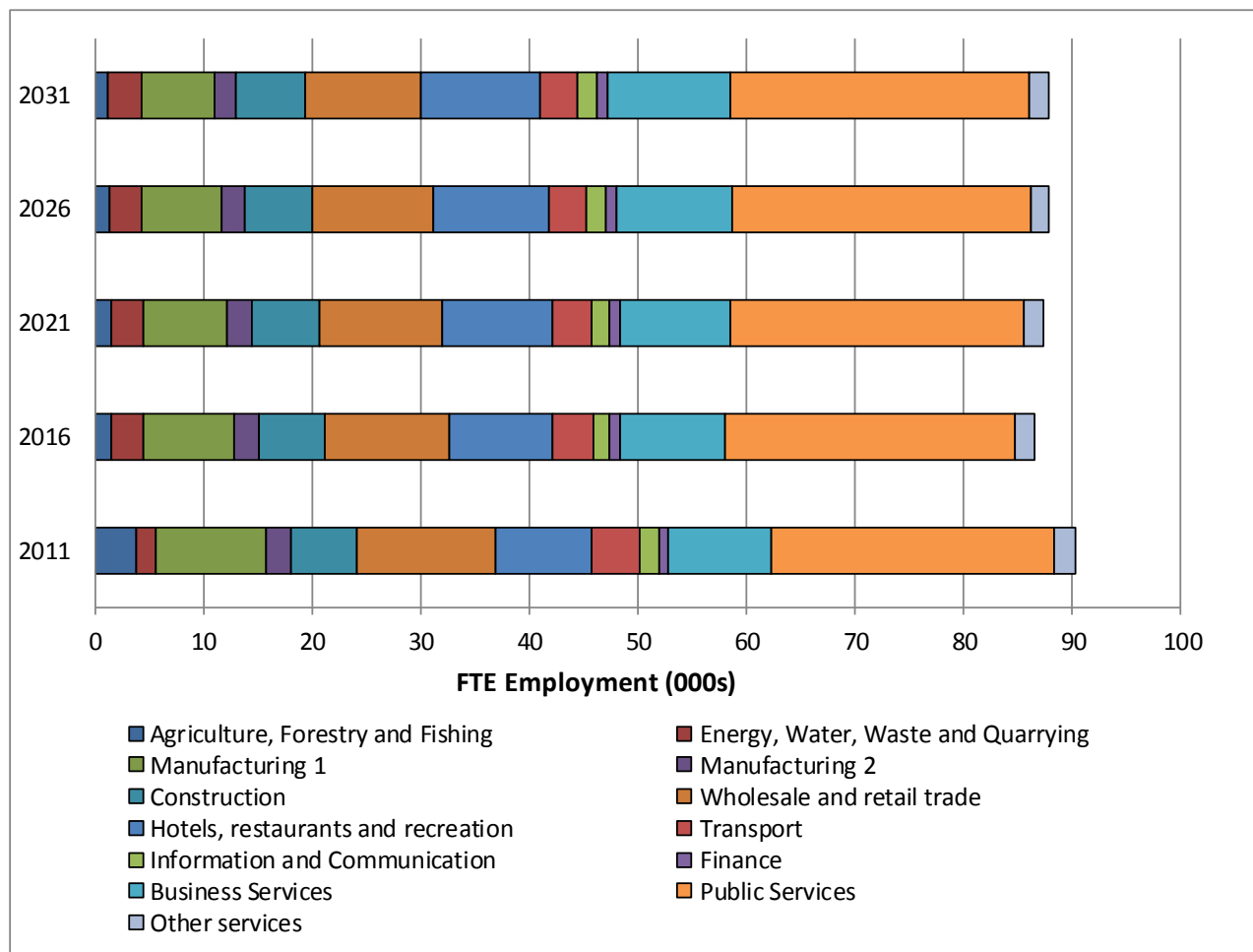
Further explanation is provided by the fact that the ratio is higher in the *Services* sectors and lower in *Manufacturing* and *Other*. Since the former increases its share of employment over the period whilst the latter two have a declining share this causes the overall headcount/FTE ratio to increase over time adding to

the trend effects at sector level. There is further discussion of this effect following more detailed presentation of the FTE and headcount projections.

### Detailed FTE Projections

The FTE projections are presented in Figure 6, below at 5-year intervals for the 13 sectors adopted for reporting purposes.

**Figure 6: FTE Employment Projections by Sector**



Source: Durham University/Cambridge Econometrics

The dominance of *Public Services* on overall employment is clearly evident in Figure 6, which accounts for around 30% of FTE employment. Other important sectors include:

- *Manufacturing 1* (more traditional manufacturing) declines by one-third from around 10,000 FTE in 2011 to 6,700 in 2031. Most sub-sectors show a decline in FTE between 2011 and 2031 with only *Pharmaceuticals* showing a modest increase.
- *Wholesale and Retail Trade* This sector covers *Trade in motor vehicles*, *Wholesale trade* and *Retail trade*, with the latter accounting for around three-quarters of FTE. The sector as a whole declines by around one-sixth between 2011 and 2031, though the decline in *retail* is not projected to be as severe as the decline in the other two sub-sectors.
- *Hotels, restaurants and recreation* This sector is projected to grow by 25% to around 12,900 FTE by 2031. This increase is almost exclusively the result of increases in *Food and beverage services*. *Accommodation* is projected to remain static.

- *Business Services* comprises a diverse range of activities such as *Legal and accounting services* and *Real estate*. FTE growth is projected to occur in all sub-sectors except *Head offices and management consulting* and *Architectural and engineering services*. Overall, FTE growth of nearly 20% is projected to occur, increasing numbers from 9,500 in 2011 to 11,200 in 2031.

The detailed data underlying Figure 6 is provided in Table 6, below and is presented in the same format to that shown earlier in Table 2 for GVA.

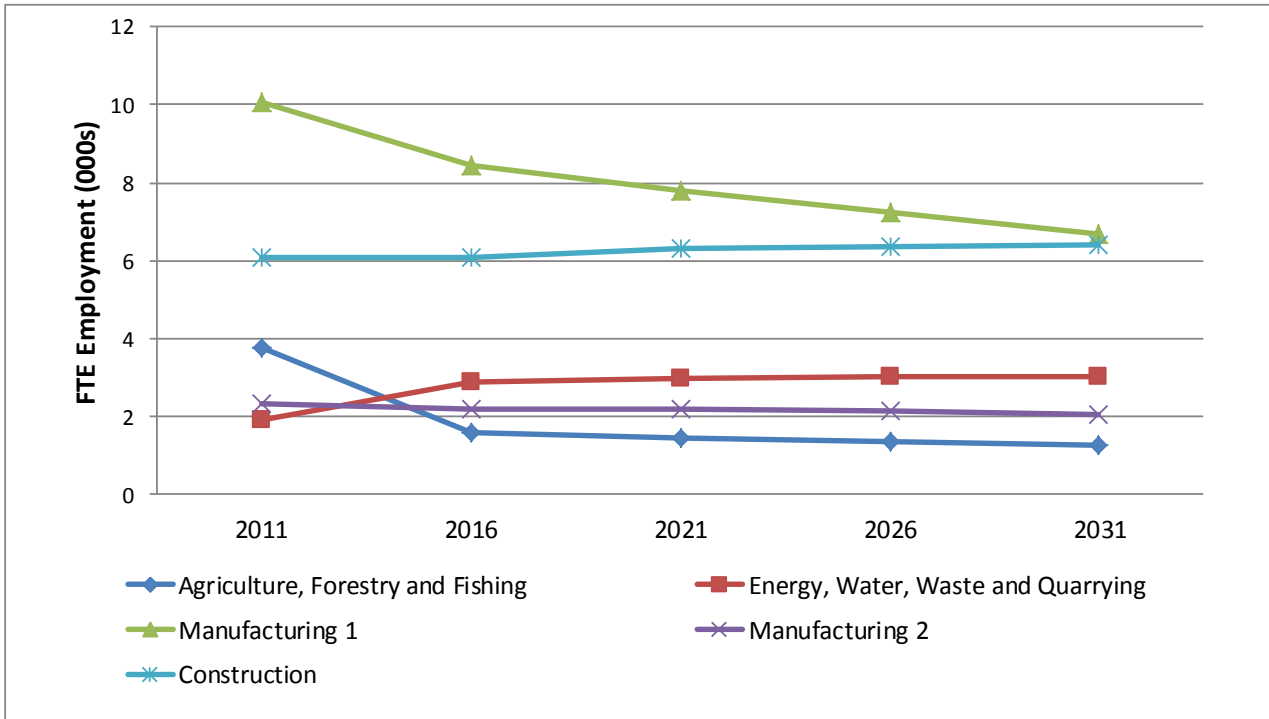
**Table 6: FTE Projections by Sector (000s)**

Sector	2011	2016	2021	2026	2031	Change 2011-31
Agriculture, Forestry and Fishing	3.8	1.6	1.5	1.4	1.3	-67%
Energy, Water, Quarrying and Waste	1.9	2.9	3.0	3.0	3.0	59%
Manufacturing 1	10.0	8.4	7.8	7.2	6.7	-33%
Manufacturing 2	2.3	2.2	2.2	2.1	2.0	-12%
Construction	6.1	6.1	6.3	6.4	6.4	5%
Wholesale and retail trade	12.8	11.4	11.3	11.0	10.7	-17%
Hotels, restaurants and recreation	8.8	9.6	10.0	10.6	10.9	25%
Transport	4.5	3.7	3.6	3.5	3.4	-23%
Information and Communication	1.8	1.6	1.7	1.8	1.8	2%
Finance	0.8	0.9	0.9	1.0	1.0	31%
Business Services	9.5	9.7	10.2	10.7	11.2	18%
Public Services	26.2	26.6	27.1	27.4	27.6	5%
Other services	1.9	1.8	1.8	1.7	1.7	-10%
<b>All Sectors</b>	<b>90.4</b>	<b>86.5</b>	<b>87.4</b>	<b>87.9</b>	<b>87.8</b>	<b>-3%</b>

Source: Durham University/Cambridge Econometrics

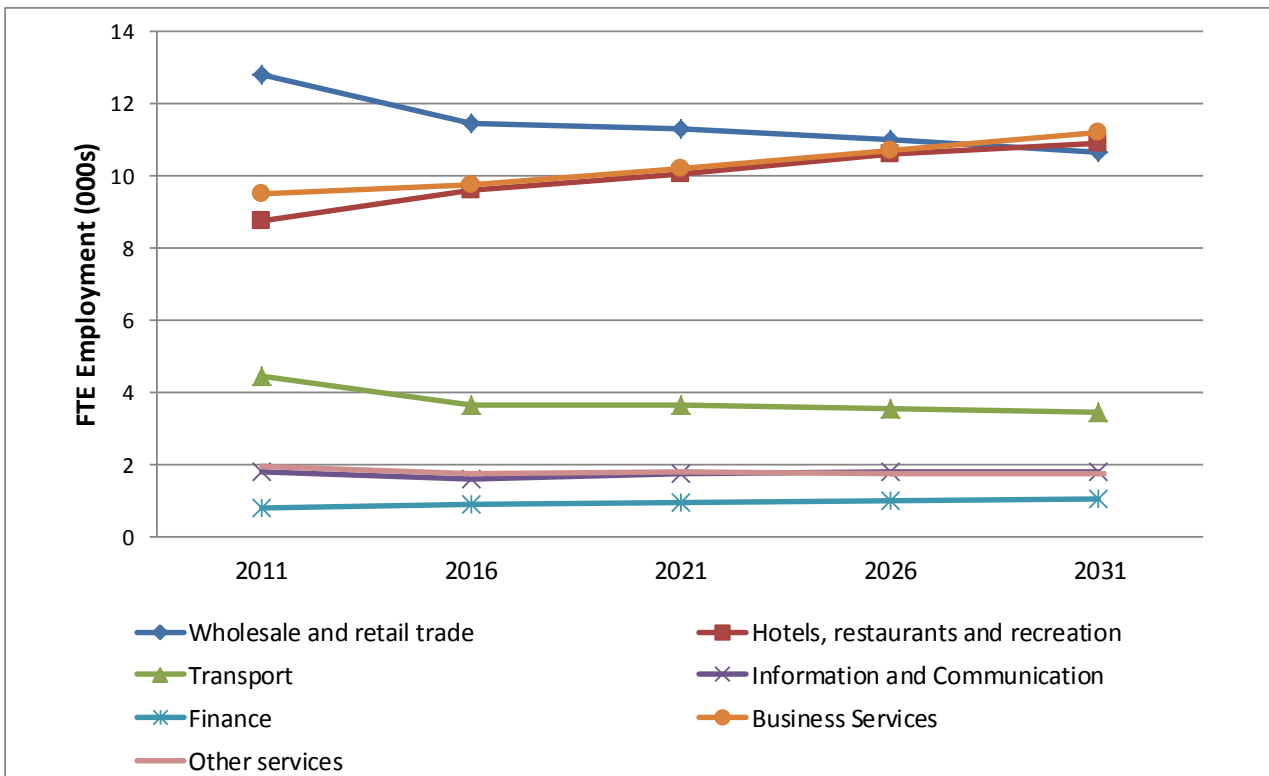
The trends in FTE employment are more readily seen in an alternative style of chart. These are presented below in Figure 7 which covers the detailed sectors within the two broad non-*Service* sectors and Figure 8 covering the broad *Service* sector.

**Figure 7: FTE Employment Projections - Non-Service Sectors**



Source: Durham University/Cambridge Econometrics

**Figure 8: FTE Employment Projections - Service Sectors<sup>16</sup>**



Source: Durham University/Cambridge Econometrics

<sup>16</sup> The *Public Services* sector is excluded from this chart due to its dominant size.

### *Detailed Headcount Projections*

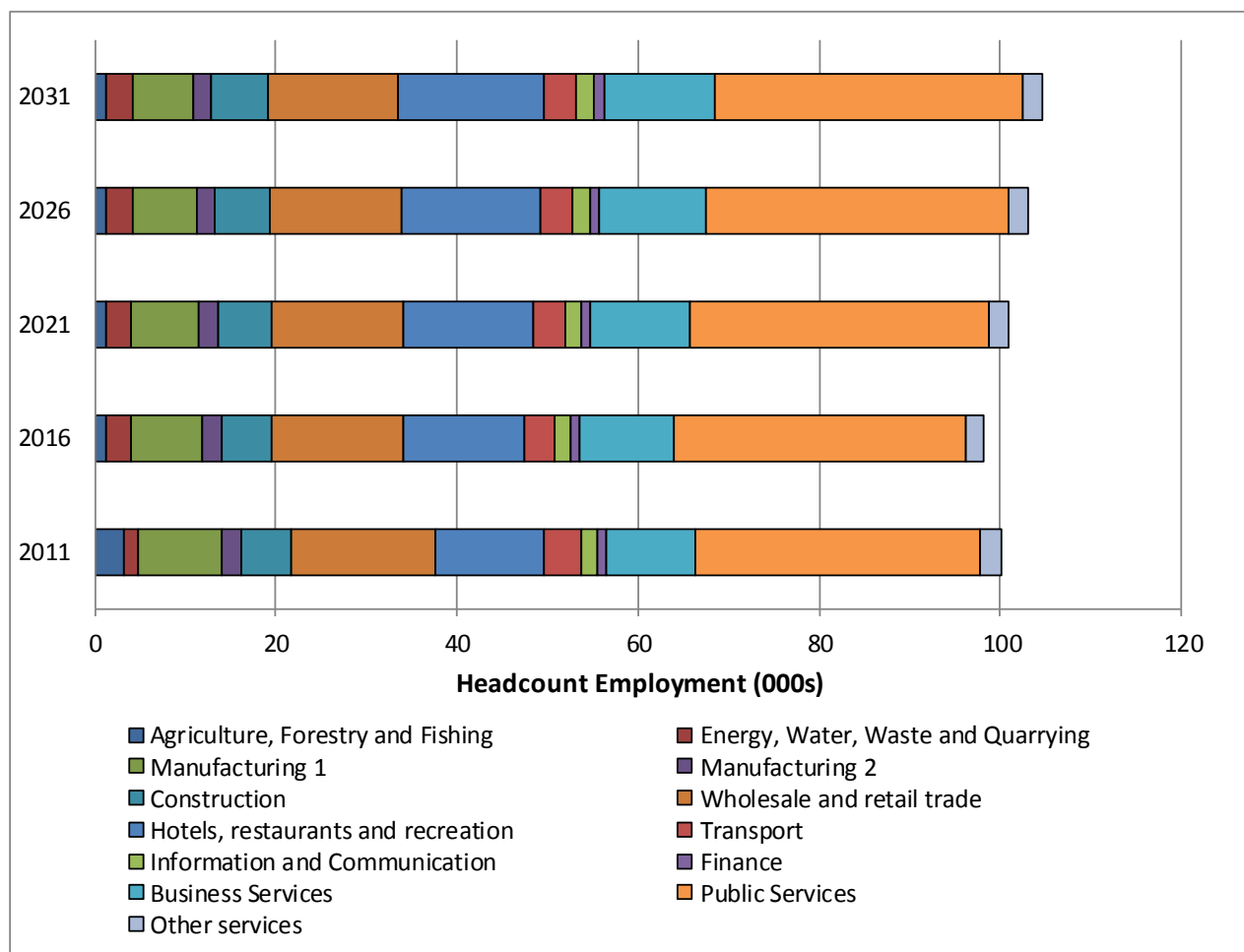
The Headcount numbers projected within the Baseline Scenario are shown below in Table 7 and in a chart format in Figure 9.

**Table 7: Headcount Projections by Sector (000s)**

<b>Sector</b>	<b>2011</b>	<b>2016</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>	<b>Change 2011-31</b>
Agriculture, Forestry and Fishing	3.2	1.4	1.3	1.3	1.2	-62%
Energy, Water, Quarrying and Waste	1.7	2.6	2.8	2.9	2.9	70%
Manufacturing 1	9.2	7.9	7.5	7.1	6.7	-27%
Manufacturing 2	2.2	2.1	2.1	2.1	2.1	-4%
Construction	5.5	5.6	5.9	6.1	6.3	14%
Wholesale and retail trade	15.9	14.5	14.6	14.5	14.3	-10%
Hotels, restaurants and recreation	12.0	13.4	14.3	15.4	16.1	35%
Transport	4.0	3.4	3.4	3.4	3.4	-16%
Information and Communication	1.9	1.7	1.8	1.9	2.0	6%
Finance	0.9	1.0	1.0	1.1	1.2	36%
Business Services	10.0	10.4	11.0	11.6	12.3	23%
Public Services	31.4	32.2	33.0	33.5	34.0	8%
Other services	2.3	2.1	2.1	2.2	2.2	-5%
<b>All Sectors</b>	<b>100.1</b>	<b>98.2</b>	<b>100.9</b>	<b>103.1</b>	<b>104.7</b>	<b>5%</b>

*Source: Durham University/Cambridge Econometrics*

**Figure 9: Headcount Employment Projections by Sector**



Source: Durham University/Cambridge Econometrics

Figure 9 broadly reflects that of the corresponding chart for FTE employment. The dominant sectors of *Public Services*, the *Wholesale and Retail Trade*, the *Hotels, restaurants and recreation* sector and *Business Services* are even more dominant. These sectors are projected to account for 75% of Headcount employment in 2031 compared to 60% of FTE employment. This difference is due to levels of part-time working which are well above average in all of these sectors except *Business Services*.

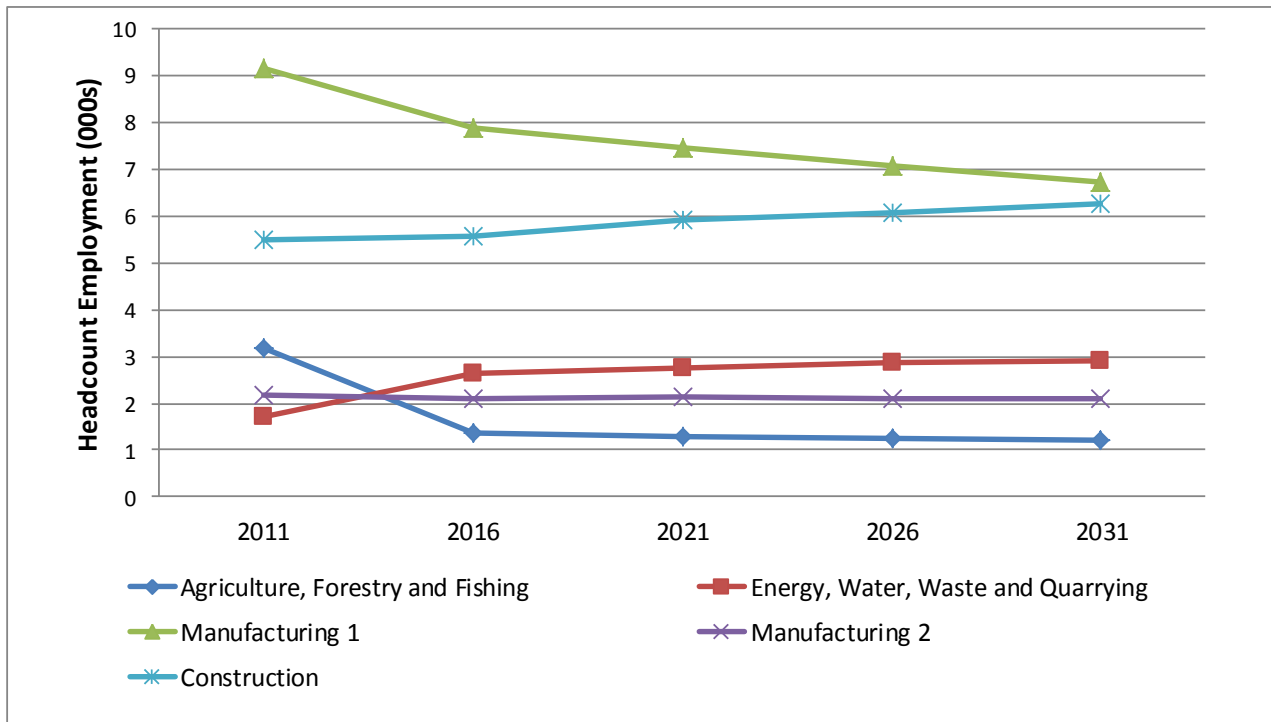
As noted previously, changes in the proportion of part-time working and/or levels of overtime working are represented by the ratio of headcount/FTE. This ratio is projected to increase across all sectors by an average of 7%. The greatest increases are projected for *Agriculture, Forestry and Fishing*, the two *Manufacturing* sectors (*Manufacturing 1* and *Manufacturing 2*) and *Transport*. Below average increases are projected for the service sectors of: *Information and Communication*; *Business Services*; *Finance*; *Public Services* and *Other Services*. The remaining sectors all show an increase in the headcount/FTE ratio which is close to the 7% average. Because the headcount/FTE ratio is increasing, headcount grows more quickly and declines less slowly than FTE, with the differences being greater for those sectors where the ratio is above average.

The effects of the headcount/FTE ratio can be readily seen when the final column of Table 6 (showing percentage changes in FTEs over 2011-31) is compared with the corresponding Headcount values in Table 7. Positive values in Table 6 become larger in Table 7, illustrating that for those sectors where FTE is projected to grow over the 20 year period, the growth in headcount occurs at a faster rate. Similarly, negative values in Table 6 are reduced in magnitude in Table 7 showing that for those sectors where there is a projected decline in FTE, there is a slower decline in headcount. An extreme case is represented by the

economy as a whole. The small decline of 3% in FTEs between 2011 and 2031 shown in Table 6 becomes an increase of 5% in Headcount terms in Table 7.

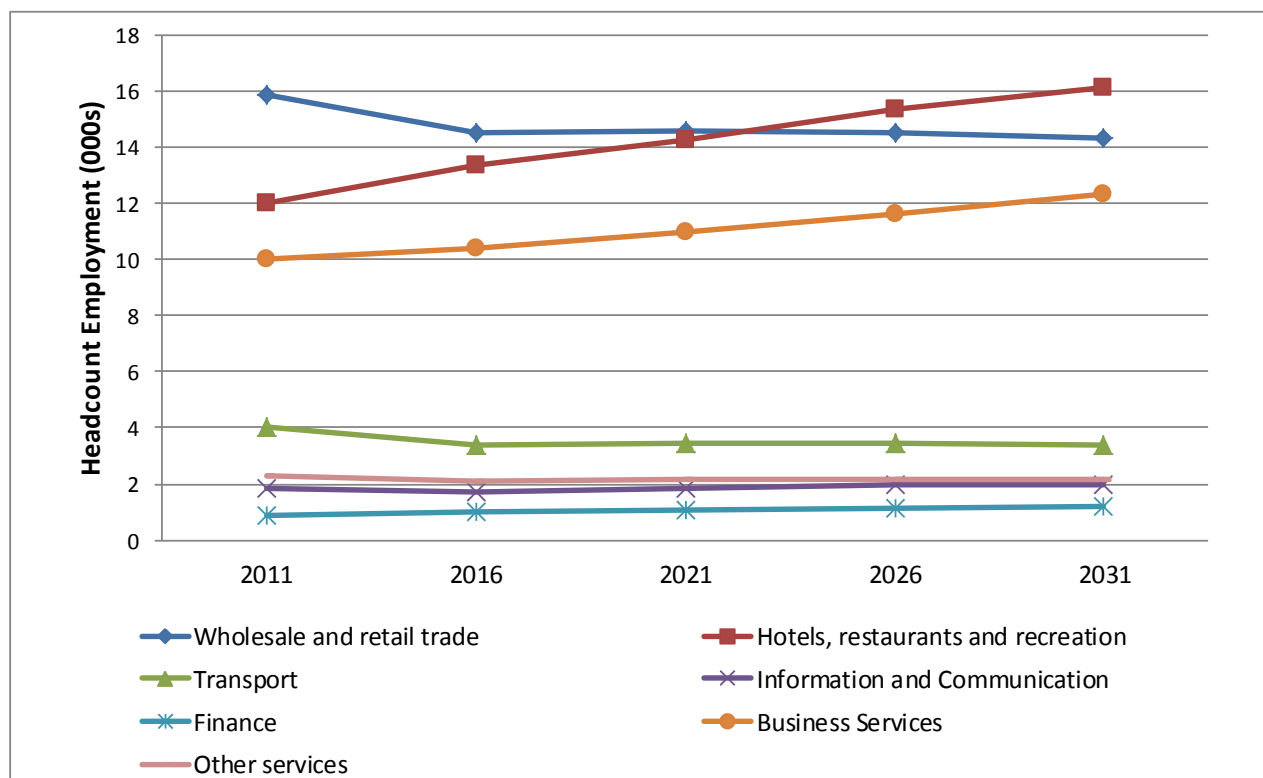
The Headcount series are shown in a chart format in Figure 10 for non-Service sectors and in Figure 11 for Services.

**Figure 10: Headcount Employment Projections - Non-Service Sectors**



Source: Durham University/Cambridge Econometrics

**Figure 11: Headcount Employment Projections - Service Sectors**



Source: Durham University/Cambridge Econometrics

## 4. Higher, Lower and Policy Scenarios

### 4.1. Scenario Creation

The Baseline Scenario represents a trajectory for Northumberland's economy based on the myriad of assumptions embedded in Cambridge Econometrics' projections along with the additional modelling assumptions required to convert the employment projections into the headcount and FTE measures that were utilised in the previous study. There is inherent uncertainty in any long term projection, particularly at the present time when there is uncertainty about the speed of economic recovery and long term growth rates. In addition to providing local projections, CE have also provided national projections for comparison purposes. These latter project national growth rates below the UK's long run average and, on this basis, there are grounds for considering that the projections for Northumberland are on the cautious side. Irrespective of these considerations, the inherent uncertainties are acknowledged through the creation of alternative scenarios representing different trajectories that the economy might take.

Three additional scenarios have been developed. Following the approach of the 2010 study, each additional scenario has been numerically derived from the Baseline Scenario. The three additional scenarios are referred to as the Lower, Upper and Policy Scenarios, respectively.

The Lower scenario assumes long term rates of growth from 2014 below those of the Baseline Scenario, whilst those of the Upper Scenario are above the Baseline. In each scenario, the same proportional adjustments are made to GVA, Headcount and FTE and are applied equally across all sectors. Effectively, this means that in any given year productivity, the mix of sectors and proportions of part time working all remain unchanged from the Baseline Scenario. In broad terms, the Lower and Upper Scenarios respectively adopt more pessimistic and optimistic views for future growth. These views are spread evenly across the economy and avoid the need to assume that some sectors are more resilient than others (in the pessimistic case) or better able to grasp opportunities (in the optimistic case). In numerical terms, the Lower and Upper



scenarios were created by adjusting the rates of headcount employment growth from those of the Baseline Scenario. A reduction of 0.1 percentage points was applied for the Lower Scenario and an increase of 0.2 percentage points was applied for the Upper Scenario. These differentials were applied from 2018 onwards with slightly larger differentials applied over the years 2014 to 2017. The scale of these adjustments was chosen to make the difference between the Upper and Lower scenarios in 2031 broadly comparable to that of the previous study. The asymmetric nature of the adjustments reflects a view that the Baseline scenario is, perhaps, on the cautious side.

The Policy Scenario was constructed differently. Levels of productivity and proportions of part-time working remain unchanged at the sector level as previously. However, some sectors are subjected to higher rates of growth, beyond those of the Upper scenario. This leads to some changes in the mix of sectors. The sectors subject to higher growth rates were selected from the full set of 45 sectors used in the CE projections. The sectors were selected following an analysis undertaken by Council Officers of economic development plans at national, regional and County level. The scenario is based on the relatively benign outlook of the Upper Scenario, coupled with a view that the various policy initiatives set out in the plans will have a long term effect on specific sectors.

The scenarios can be compared by considering the annual average rates of GVA growth across individual sectors and the economy as a whole. This comparison is provided in Table 8. Rates shown are the average annual rates of growth for the period between 2013 and 2031. This period has been chosen to reflect the continuous period of growth in the Northumberland's economy. The growth rates provide a reasonable summary measure for evaluating the scenarios in overall terms.

**Table 8: Average Annual GVA Growth Rates, 2013-31**

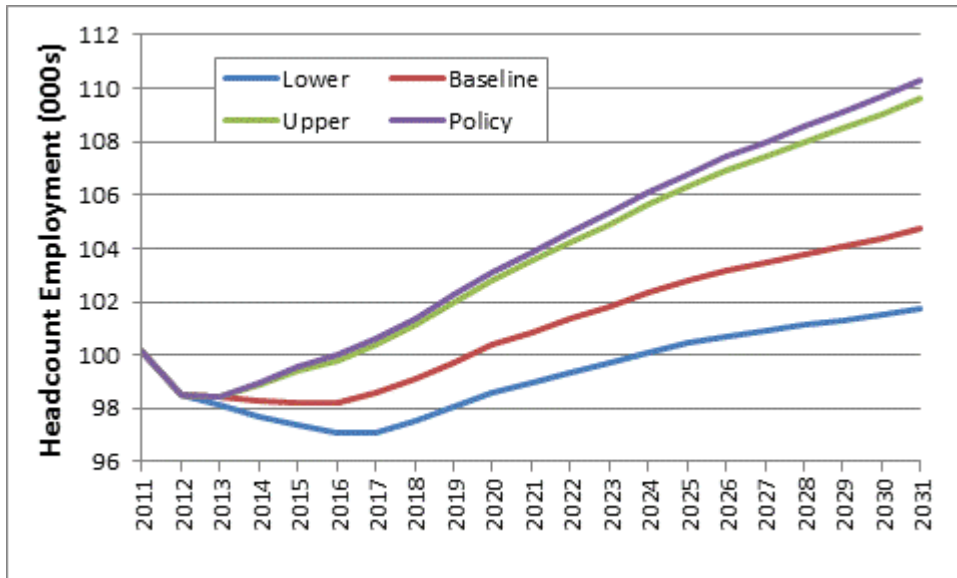
Sector	Scenario			
	Lower	Baseline	Upper	Policy
Agriculture, Forestry and Fishing	0.88%	1.02%	1.28%	1.28%
Energy, Water, Waste and Quarrying	1.21%	1.35%	1.61%	1.61%
Manufacturing 1	0.77%	0.91%	1.17%	1.23%
Manufacturing 2	1.93%	2.07%	2.33%	2.40%
Construction	1.61%	1.75%	2.01%	2.08%
Wholesale and retail trade	0.88%	1.02%	1.28%	1.31%
Hotels, restaurants and recreation	1.76%	1.91%	2.17%	2.22%
Transport	0.51%	0.66%	0.91%	0.94%
Information and Communication	3.43%	3.58%	3.85%	3.91%
Finance	1.42%	1.56%	1.82%	1.89%
Business Services	3.24%	3.39%	3.65%	3.71%
Public Services	0.95%	1.09%	1.35%	1.36%
Other services	0.91%	1.06%	1.31%	1.33%
<b>All Sectors</b>	<b>1.51%</b>	<b>1.66%</b>	<b>1.92%</b>	<b>1.95%</b>

*Source: Durham University/Cambridge Econometrics*

## 4.2. Employment Projections

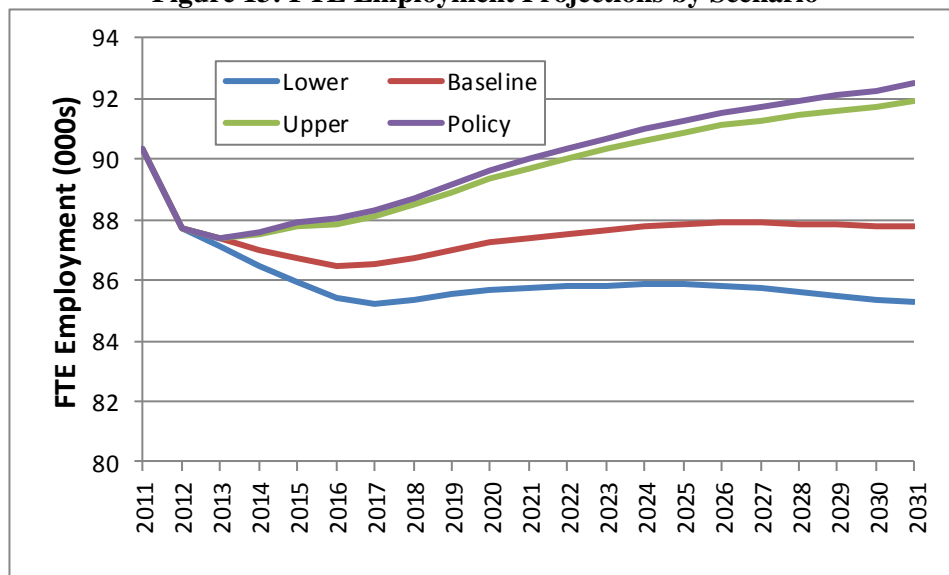
Overall employment projections are compared across all 4 scenarios in Figure 12 for Headcount and in Figure 13 for FTEs.

**Figure 12: Headcount Employment Projections by Scenario**



Source: Durham University/Cambridge Econometrics

**Figure 13: FTE Employment Projections by Scenario**



Source: Durham University/Cambridge Econometrics

On both measures, the difference between the Upper and Baseline Scenarios exceeds the difference between the Baseline and Lower Scenarios. This simply reflects the underlying assumptions used in scenario construction. CE's projections (which are embodied in the Baseline Scenario) have a relatively low long term growth rate, and well below the 2% rate used in the previous study. The Policy Scenario represents adjustment of the Upper Scenario and changes its overall employment only marginally.

The employment projections for each of the additional scenarios are shown below in Table 9 for FTE and Table 10 for headcount. These complement the values for the Baseline Scenario shown earlier in Table 6 and Table 7, respectively.

**Table 9: FTE Projections for Lower, Upper and Policy Scenarios (000s)**

Sector	2011	2016	2021	2026	2031	Change 2011-31
<b>Lower Scenario</b>						
Agriculture, Forestry and Fishing	3.8	1.6	1.4	1.3	1.2	-68%
Energy, Water, Quarrying and Waste	1.9	2.8	2.9	2.9	2.9	54%
Manufacturing 1	10.0	8.3	7.7	7.1	6.5	-35%
Manufacturing 2	2.3	2.2	2.2	2.1	2.0	-14%
Construction	6.1	6.0	6.2	6.2	6.2	2%
Wholesale and retail trade	12.8	11.3	11.1	10.8	10.4	-19%
Hotels, restaurants and recreation	8.8	9.5	9.9	10.4	10.6	21%
Transport	4.5	3.6	3.5	3.4	3.3	-25%
Information and Communication	1.8	1.6	1.7	1.7	1.7	-1%
Finance	0.8	0.9	0.9	1.0	1.0	28%
Business Services	9.5	9.6	10.0	10.4	10.9	15%
Public Services	26.2	26.3	26.6	26.8	26.8	2%
Other services	1.9	1.7	1.7	1.7	1.7	-13%
<b>All Sectors</b>	<b>90.4</b>	<b>85.4</b>	<b>85.8</b>	<b>85.8</b>	<b>85.3</b>	<b>-6%</b>
<b>Upper Scenario</b>						
Agriculture, Forestry and Fishing	3.8	1.6	1.5	1.4	1.3	-65%
Energy, Water, Quarrying and Waste	1.9	2.9	3.0	3.1	3.2	66%
Manufacturing 1	10.0	8.6	8.0	7.5	7.0	-30%
Manufacturing 2	2.3	2.2	2.3	2.2	2.1	-8%
Construction	6.1	6.2	6.5	6.6	6.7	10%
Wholesale and retail trade	12.8	11.6	11.6	11.4	11.2	-13%
Hotels, restaurants and recreation	8.8	9.8	10.3	11.0	11.4	30%
Transport	4.5	3.7	3.7	3.7	3.6	-20%
Information and Communication	1.8	1.6	1.8	1.8	1.9	6%
Finance	0.8	0.9	1.0	1.0	1.1	37%
Business Services	9.5	9.9	10.4	11.1	11.7	24%
Public Services	26.2	27.1	27.8	28.4	28.9	10%
Other services	1.9	1.8	1.8	1.8	1.8	-6%
<b>All Sectors</b>	<b>90.4</b>	<b>87.9</b>	<b>89.7</b>	<b>91.1</b>	<b>91.9</b>	<b>2%</b>
<b>Policy Scenario</b>						
Agriculture, Forestry and Fishing	3.8	1.6	1.5	1.4	1.3	-65%
Energy, Water, Quarrying and Waste	1.9	2.9	3.0	3.1	3.2	66%
Manufacturing 1	10.0	8.6	8.1	7.6	7.1	-29%
Manufacturing 2	2.3	2.3	2.3	2.2	2.2	-7%
Construction	6.1	6.2	6.5	6.7	6.8	11%
Wholesale and retail trade	12.8	11.7	11.6	11.5	11.2	-12%
Hotels, restaurants and recreation	8.8	9.8	10.4	11.1	11.5	32%
Transport	4.5	3.7	3.7	3.7	3.6	-19%
Information and Communication	1.8	1.6	1.8	1.9	1.9	7%
Finance	0.8	0.9	1.0	1.0	1.1	39%
Business Services	9.5	9.9	10.5	11.2	11.9	25%
Public Services	26.2	27.1	27.8	28.4	28.9	10%
Other services	1.9	1.8	1.8	1.8	1.8	-6%
<b>All Sectors</b>	<b>90.4</b>	<b>88.1</b>	<b>90.0</b>	<b>91.5</b>	<b>92.5</b>	<b>2%</b>

**Table 10: Headcount Projections for Lower, Upper and Policy Scenarios (000s)**

<b>Sector</b>	<b>2011</b>	<b>2016</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>	<b>Change 2011-31</b>
<b>Lower Scenario</b>						
Agriculture, Forestry and Fishing	3.2	1.3	1.3	1.2	1.2	-63%
Energy, Water, Quarrying and Waste	1.7	2.6	2.7	2.8	2.8	65%
Manufacturing 1	9.2	7.8	7.3	6.9	6.5	-29%
Manufacturing 2	2.2	2.1	2.1	2.1	2.0	-6%
Construction	5.5	5.5	5.8	5.9	6.1	11%
Wholesale and retail trade	15.9	14.3	14.3	14.2	13.9	-12%
Hotels, restaurants and recreation	12.0	13.2	14.0	15.0	15.7	31%
Transport	4.0	3.4	3.4	3.4	3.3	-18%
Information and Communication	1.9	1.7	1.8	1.9	1.9	3%
Finance	0.9	1.0	1.0	1.1	1.2	32%
Business Services	10.0	10.3	10.8	11.4	12.0	19%
Public Services	31.4	31.9	32.3	32.7	33.0	5%
Other services	2.3	2.1	2.1	2.1	2.1	-8%
<b>All Sectors</b>	<b>100.1</b>	<b>97.1</b>	<b>99.0</b>	<b>100.7</b>	<b>101.7</b>	<b>2%</b>
<b>Upper Scenario</b>						
Agriculture, Forestry and Fishing	3.2	1.4	1.3	1.3	1.2	-61%
Energy, Water, Quarrying and Waste	1.7	2.7	2.8	3.0	3.1	78%
Manufacturing 1	9.2	8.0	7.7	7.3	7.0	-23%
Manufacturing 2	2.2	2.1	2.2	2.2	2.2	1%
Construction	5.5	5.7	6.1	6.3	6.5	19%
Wholesale and retail trade	15.9	14.7	15.0	15.1	15.0	-6%
Hotels, restaurants and recreation	12.0	13.6	14.7	16.0	16.9	41%
Transport	4.0	3.4	3.5	3.6	3.6	-12%
Information and Communication	1.9	1.7	1.9	2.0	2.1	11%
Finance	0.9	1.0	1.1	1.2	1.2	42%
Business Services	10.0	10.6	11.3	12.1	12.9	29%
Public Services	31.4	32.8	33.8	34.8	35.6	13%
Other services	2.3	2.1	2.2	2.2	2.3	-1%
<b>All Sectors</b>	<b>100.1</b>	<b>99.8</b>	<b>103.5</b>	<b>106.9</b>	<b>109.6</b>	<b>9%</b>
<b>Policy Scenario</b>						
Agriculture, Forestry and Fishing	3.2	1.4	1.3	1.3	1.2	-61%
Energy, Water, Quarrying and Waste	1.7	2.7	2.8	3.0	3.1	78%
Manufacturing 1	9.2	8.0	7.7	7.4	7.1	-22%
Manufacturing 2	2.2	2.1	2.2	2.2	2.2	2%
Construction	5.5	5.7	6.1	6.4	6.6	21%
Wholesale and retail trade	15.9	14.8	15.0	15.1	15.1	-5%
Hotels, restaurants and recreation	12.0	13.7	14.7	16.1	17.1	42%
Transport	4.0	3.5	3.5	3.6	3.6	-11%
Information and Communication	1.9	1.7	1.9	2.0	2.1	12%
Finance	0.9	1.0	1.1	1.2	1.3	44%
Business Services	10.0	10.6	11.3	12.2	13.0	30%
Public Services	31.4	32.8	33.8	34.8	35.6	13%
Other services	2.3	2.1	2.2	2.2	2.3	0%
<b>All Sectors</b>	<b>100.1</b>	<b>100.0</b>	<b>103.9</b>	<b>107.4</b>	<b>110.3</b>	<b>10%</b>

Table 11 presents the employment levels for each Scenario in 2031, representing these as differences from the Baseline Scenario. The data are shown for Headcounts only, the patterns of differences for FTEs follow the same pattern but with slightly smaller numbers.

**Table 11: Headcount Employment 2031 – Differences from Baseline Scenario (000s)**

Sector	Difference		
	Baseline - Lower	Upper - Baseline	Policy-Baseline
Agriculture, Forestry and Fishing	0.03	0.06	0.06
Energy, Water, Waste and Quarrying	0.08	0.14	0.14
Manufacturing 1	0.19	0.32	0.40
Manufacturing 2	0.06	0.10	0.12
Construction	0.18	0.29	0.37
Wholesale and retail trade	0.41	0.67	0.75
Hotels, restaurants and recreation	0.46	0.76	0.92
Transport	0.10	0.16	0.17
Information and Communication	0.06	0.09	0.12
Finance	0.03	0.06	0.07
Business Services	0.35	0.58	0.73
Public Services	0.97	1.59	1.63
Other services	0.06	0.10	0.11
<b>All Sectors</b>	<b>2.99</b>	<b>4.91</b>	<b>5.57</b>

Source: Durham University/Cambridge Econometrics

In 2031, the Lower Scenario projects a headcount employment in 2031 that is 3,000 (just under 3%) lower than the Baseline Scenario. The Upper Scenario projects 2031 values that 4,900 higher than the Baseline (just above 4.5%) The Policy Scenario adds a further difference of around 700, bringing the overall difference from the Baseline to around 5,600 or just under 5.5%. In the Upper and Lower Scenarios, differences from the Baseline are contributed in proportion to the levels of employment within each sector (see Table 7 earlier). In consequence, the differences between these scenarios are largely contributed by the dominant sectors: *Public Services*; *Hotels, restaurants and recreation*; *Wholesale and retail trade*; and *Business services*. Collectively, these sectors account for three-quarters of the overall difference from the Baseline Scenario in each case.

The additional 700 headcount jobs added to the Upper Scenario by the Policy Scenario are contributed differently. *Business Services* and *Hotels, restaurants and recreation* contribute almost half the additional number, whilst the two *Manufacturing* sectors, *Construction* and *Wholesale and retail trade* contribute a further 40%.

In FTE terms, the differences from the Baseline Scenario in 2031 are around 2,500 less in the Lower Scenario and 4,100 and 4,700 more for the Upper and Policy Scenarios, respectively.

## 5. Land Use Projections

The employment projections set out in Sections 3 and 4 have been used as the basis of creating projections for employment floorspace and employment land. The methods used follow those used in the 2010 study. Like the 2010 study, the brief placed emphasis on B use classes covering offices (other than A2 - town centre offices), industrial operations, and storage and distribution. However, the methodology also allows the production of floorspace estimates for other employment based use classes: in particular for use classes A1, A2, A3 and C1, where activity is sometimes located on allocated employment land.

Prior to setting out the projections of required floorspace and land, Sections 5.1 and 5.2 present some technical information. The former discusses how the sectors used for economic projections have been classified into use classes, whilst the latter presents the density factors used to convert employee numbers to floorspace.

### 5.1. Economic Sectors and Use Classes

The change from SIC 2003 to SIC 2007, previously discussed in Section 2.1, has presented a particular challenge for the projection of employment floorspace and land requirements. The previous study contained a translation or mapping from economic sectors to use classes which allowed that study's employment projections to be converted to floorspace and land projections by use class. The previous study's sectors were defined in terms of SIC 2003. The aim of the present study has been to preserve this relationship between economic sectors and use classes whilst utilising employment projections which are based on SIC 2007. Details of the approach used can be found in Appendix 2.

### 5.2. Conversion Factors for Employment Floorspace

The factors for converting employment projections into floorspace differ from those of the previous study which used factors set out in earlier work undertaken by GHK<sup>17</sup>. A specific requirement for the present study was to use the conversion factors published by the Homes and Communities Agency (HCA)<sup>18</sup>.

The conversion factors are called *density factors* and are expressed as floorspace in square metres per employee. Floorspace can be measured on one of three different bases and summary descriptions of these taken from the HCA Guide are presented below.

- **Gross External Area (GEA)** – *this measurement includes walls, plant rooms and outbuildings, but excludes external space such as balconies and terraces. It has a narrow field of use mostly limited to calculating building costs for large industrial and warehouse buildings, planning applications and approvals, council tax banding, and rating in Scotland for industrial buildings.*
- **Gross Internal Area (GIA)** – *this refers to the entire area inside the external walls of a building and includes corridors, lifts, plant rooms, service accommodation (e.g. toilets). It is a widely used metric used in calculating building costs, marketing, valuation, property management and rating (in England and Wales) of industrial buildings (including ancillary offices), warehouses and leisure units and also the valuation of new residential developments.*
- **Net Internal Area (NIA)** – *this is commonly referred to as the net lettable or 'usable' area of offices and retail units. It includes entrance halls, kitchens and cleaners' cupboards, but excludes corridors, internal walls, stairwells, lifts, WCs and other communal areas. It is a widely used metric and is the recognised method for marketing, valuation, property management and rating for offices, shops and supermarkets.*

The HCA Guide specifies density factors on the basis of NIA for all use classes except B2 (factories) where it uses GIA and B8 (warehouses) where GEA is used.

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<sup>17</sup> GHK (April 2009) *North East Business Accommodation Project Baseline Report (report for One North East and North East Assembly)*

<sup>18</sup> Drivers Jonas Deloitte (2010) *Employment Densities Guide 2nd Edition (report for Homes and Communities Agency and Office of Project and Programme Advice and Training)*.

The HCA Guide recommends that for most use classes reductions of 15-20% be applied when converting from gross (GIA) to net (NIA) floorspace – these are equivalent to additions of between 17.6% and 25% when converting from NIA to GIA. In the case of warehouses the guide recommends that a much smaller net to gross addition be applied and a value of 5% has been used in this study.

Factors for converting between gross internal (GIA) and gross external (GEA) measurements of floorspace are not specified in the HCA guide. Instead use has been made of the values applied in the previous study and set out in the GHK report. Conversion from GIA to GEA involves an addition of 3.5% in the case of use classes B1 and B2 and 10% for classes A1, A2, A3 and C1. For warehouses GIA and GEA have been assumed to be the same.

For some use classes, the HCA Guide specifies more than one possible density factor. Following consultation with Council Officers the following approach has been used to determining density factors used in this study

- a single density factor for each use class has been selected, consistent with the HCA Guide values
- where several sub-groups are identified in the guide for a particular use class, the factor has been selected on the basis of Officers’ views of the mix of those sub-groups within Northumberland
- where density factors are not specified in the HCA Guide values have been taken from the GHK report – this affects use classes B1b (Research and Development) and C1 (Hotels, boarding and guest houses).

The results of this approach are set out in Table 12 below.

**Table 12: Use Class Density and Uplift Factors**

Use Class	Density Factors		Uplift Factors	
	m <sup>2</sup> per employee	Basis	GIA/NIA	GEA/GIA
A1	18	NIA	1.25	1.1
A2	16	NIA	1.25	1.1
A3	18	NIA	1.25	1.1
B1a	11	NIA	1.25	1.035
B1b	29	GIA	1.25	1.035
B1c	47	NIA	1.25	1.035
B2	36	GIA	1.25	1.035
B8	70	GEA	1.05	1.0
C1	13	GIA	1.25	1.1

The uplift factors shown in the final two columns allow the density factors and projected floorspaces to be converted from one basis to another. The factor labelled “GIA/NIA” converts between GIA and NIA: floorspaces or density factors measured on the basis of NIA are converted to the GIA basis by multiplying by this factor; and the reverse GIA to NIA conversion is performed by dividing by it. The factor labelled “GEA/GIA” performs a similar conversion from GIA to GEA (by multiplication) and in the reverse direction (by division). In effect, therefore, the uplift factors allow density factors to be converted to a common basis, irrespective of the basis on which they are initially specified.

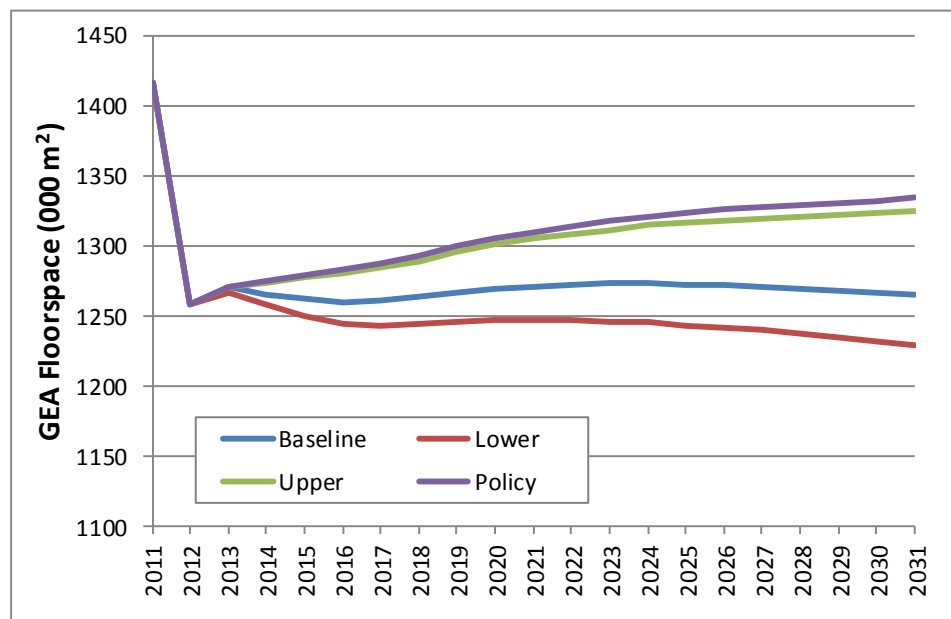
Along with the mappings from economic sectors to use classes set out in Appendix 2, Table 12 provides the framework for converting the employment projections reported in Sections 3 and 4 into employment floorspace projections.

### 5.3. Employment Floorspace Projections

Employment floorspace projections are presented for the gross external area (GEA) measures of employment space. These results are comparable with the gross external projections of the previous study. Measures based on NIA and GIA have been reported separately to the Council.

Figure 14 below shows the projected demand for GEA floorspace in the B category use classes.

**Figure 14: GEA Floorspace Projections – B Category Use Classes**



Source: Durham University

The charts for NIA and GIA show very similar pictures, with a very sharp downturn in all scenarios between 2011 and 2012. The downturn amounts to around 11% of the estimated requirement for 2011. Discussion of the reasons for this and of the subsequent changes to 2031 are both deferred to Section 5.4, which presents the corresponding projections for employment land within the B use classes.

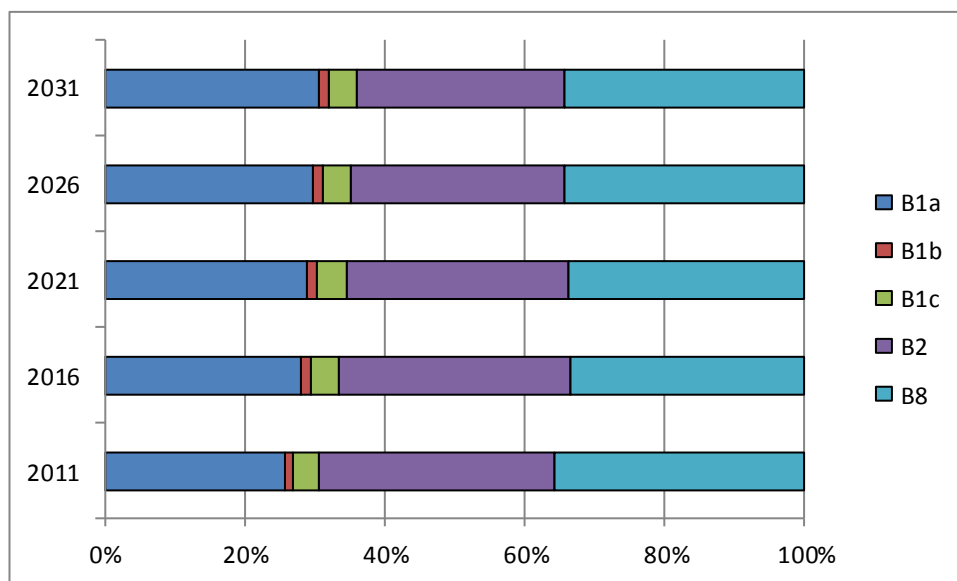
The proportions of floorspace within the B use classes are shown below in Figure 15 for the Baseline Scenario. The proportion of floorspace in the B1 use classes increases by 5 percentage points between 2011 and 2031 whilst that in B2 decreases by 4 points and B8 by 1 point. The other scenarios are not shown because the other scenarios are identical in the case of the Lower and Upper Scenarios, and almost identical for the Policy Scenario.

The reasons for this are that although the mix of economic sectors changes over the projection horizon, in any given year the mix varies only size and not in proportional terms between the Baseline, Lower and Upper Scenarios. Table 5 (in Section 3.2) shows that in the Baseline Scenario *Manufacturing's* share of total employment declines from 11% in 2011 to 8% in 2031 and these same percentages apply equally in the case of the Lower and Upper Scenarios, because of the way these scenarios have been constructed. The same mapping from economic sectors to use classes is applied in all scenarios and, as a result, the proportions shown in Figure 15 for the Baseline Scenario apply equally to the Lower and Upper Scenarios.

For the Policy Scenario, the differences in the mix of sectors are insufficient to perturb the proportions illustrated in the chart by more than 0.1 percentage points leading to an almost identical picture.



**Figure 15: GEA Floorspace Proportions within B Use Classes, Baseline Scenario**



Source: Durham University

The numerical results for all use classes and scenarios are presented in the tables below.

**Table 13: Floorspace Projections – Baseline Scenario**

Use Class	2011	2016	2021	2026	2031	Net Change 2011-31
B1a	366	354	368	378	387	21
B1b	14	17	18	18	19	4
B1c	55	52	53	52	50	-5
B2	476	416	402	388	374	-101
B8	505	421	430	435	436	-69
<b>B Subtotal</b>	<b>1416</b>	<b>1260</b>	<b>1271</b>	<b>1272</b>	<b>1266</b>	<b>-150</b>
A1	97	93	93	93	91	-5
A2	239	259	266	270	273	34
A3	173	176	195	210	222	50
C1	25	25	28	30	32	7
<b>Grand Total</b>	<b>1949</b>	<b>1814</b>	<b>1853</b>	<b>1875</b>	<b>1885</b>	<b>-64</b>

Units: GEA 000 m2 Source: Durham University

**Table 14: Floorspace Projections – Lower Scenario**

Use Class	2011	2016	2021	2026	2031	Net Change 2011-31
B1a	366	350	361	369	376	10
B1b	14	17	17	18	18	4
B1c	55	52	52	51	49	-6
B2	476	411	395	379	364	<b>-112</b>
B8	505	416	422	425	423	-81
<b>B Subtotal</b>	<b>1416</b>	<b>1245</b>	<b>1247</b>	<b>1242</b>	<b>1230</b>	-187
A1	97	92	92	91	89	-8
A2	239	256	261	263	265	27
A3	173	174	191	205	216	43
C1	25	25	27	30	31	6
<b>Grand Total</b>	<b>1949</b>	<b>1792</b>	<b>1818</b>	<b>1831</b>	<b>1831</b>	<b>-118</b>

Units: GEA 000 m<sup>2</sup> Source: Durham University

**Table 15: Floorspace Projections – Upper Scenario**

Use Class	2011	2016	2021	2026	2031	Net Change 2011-31
B1a	366	359	378	392	405	39
B1b	14	17	18	19	19	5
B1c	55	53	54	54	53	-3
B2	476	423	413	403	392	-84
B8	505	428	441	451	456	-49
<b>B Subtotal</b>	<b>1416</b>	<b>1280</b>	<b>1305</b>	<b>1318</b>	<b>1325</b>	<b>-91</b>
A1	97	94	96	96	96	-1
A2	239	264	273	280	286	47
A3	173	179	201	218	233	60
C1	25	26	28	31	34	9
<b>Grand Total</b>	<b>1949</b>	<b>1843</b>	<b>1903</b>	<b>1944</b>	<b>1973</b>	<b>24</b>

Units: GEA 000 m<sup>2</sup> Source: Durham University

**Table 16: Floorspace Projections – Policy Scenario**

Use Class	2011	2016	2021	2026	2031	Net Change 2011-31
B1a	366	360	379	394	407	42
B1b	14	17	18	19	20	5
B1c	55	53	55	54	53	-2
B2	476	424	415	406	396	-80
B8	505	428	442	452	458	-47
<b>B Subtotal</b>	<b>1416</b>	<b>1283</b>	<b>1310</b>	<b>1326</b>	<b>1334</b>	<b>-82</b>
A1	97	95	96	97	96	0
A2	239	264	274	281	288	49
A3	173	180	202	220	236	63
C1	25	26	29	32	34	9
<b>Grand Total</b>	<b>1949</b>	<b>1848</b>	<b>1911</b>	<b>1955</b>	<b>1988</b>	<b>39</b>

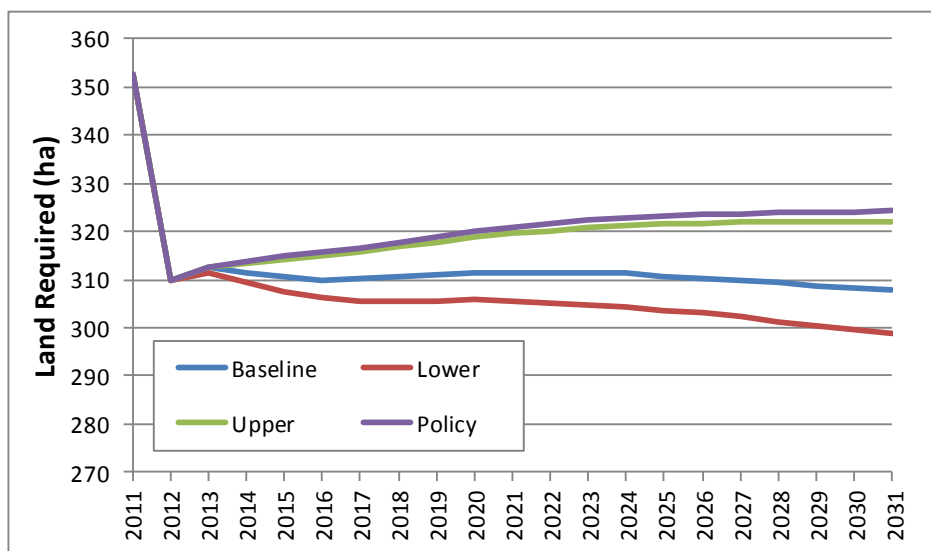
Units: GEA 000 m<sup>2</sup> Source: Durham University

#### 5.4. Employment Land Projections

The final set of projections are those of projected demand for employment land for the B category use classes. The projections are derived from the GEA floorspace projections used in the preceding section. The HCA guide does not provide factors for converting floorspace into land. Instead, these factors (called *gross plot ratios*) have been taken from the GHK report<sup>19</sup>. The values used are 6050m<sup>2</sup> of GEA floorspace per hectare of land for use classes B1a and B1b and 3575m<sup>2</sup>/ha for use classes B1c, B2 and B8.

The resulting projections are shown chart form in Figure 16.

**Figure 16: Land Requirement Projections - B Category Use Classes**



Source: Durham University

<sup>19</sup> *Ibid*, p35.

The patterns are very similar to those shown earlier in Figure 14 for floorspace, though the rates of growth in the period from 2013 onwards are reduced in all 4 scenarios.

There are sharp downturns of 11% in floorspace (in Figure 14) and in 12% employment land (Figure 16) between 2011 and 2012. These are considerably more severe than the reductions in employment over the same period presented earlier in Figure 5 (Section 3.2). There two reasons for this. First, employment in the B category use classes contracted considerably more than in the economy as a whole – around 7.5% compared to 1.5% measured on a headcount basis. Second within the B category use classes, the reductions in employment falling within B2 (factories) and B8 (warehouses) were considerably higher. Since these two use classes have considerably higher floorspace requirements per employee (density factors) than the B1 class<sup>20</sup> and lower plot ratios (implying a greater land requirement for each unit of floorspace) the level of reductions are increased further to the values of 11% noted for floorspace and 12% for employment land.

In the years from 2013, the floorspace and land requirements show a small decline in both the Baseline and Lower Scenarios, equivalent to 1% and 2%, respectively over the subsequent 3-4 years. Beyond this the Baseline Scenario increases before tailing off again. Compared to 2014, and therefore to estimated current levels of demand, floorspace and land are, respectively, unchanged and 1% lower in 2031 in the Baseline Scenario. For the Lower scenario the corresponding figures are 2% lower for floorspace and 3% lower for land.

The Upper and Policy scenarios each show modest and steady increases in both floorspace and land projections, with 2031 floorspace values nearly 4-4½% above those for 2014, whilst land values are 3-3½% higher.

The differences between the floorspace and land projections are the result of the small increase in the proportion of floorspace in B1 use classes and the corresponding decrease in B2 and B8. The latter have a lower plot ratio and the decreasing trend in their proportion causes a slight increasing trend in the average plot ratio across all the B category use classes. It is this effect that reduces the growth rates of the land requirement compared to those of floorspace.

The numerical results for all four scenarios are presented in the tables, below.

**Table 17: Land Requirement Projections – Baseline Scenario**

Use Class	2011	2016	2021	2026	2031	Net Change 2011-31
B1a	60.5	58.5	60.9	62.5	63.9	3.4
B1b	2.4	2.8	2.9	3.0	3.1	0.7
B1c	15.5	14.6	14.9	14.6	14.1	-1.4
B2	133.1	116.3	112.5	108.7	104.7	-28.3
B8	141.1	117.8	120.3	121.6	121.8	-19.3
<b>Total</b>	<b>352.6</b>	<b>310.0</b>	<b>311.4</b>	<b>310.4</b>	<b>307.7</b>	<b>-44.9</b>

*Units: ha Source: Durham University*

<sup>20</sup> Within B1, use class B1a accounts for around 95% of employment.

**Table 18: Land Requirement Projections – Lower Scenario**

<b>Use Class</b>	<b>2011</b>	<b>2016</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>	<b>Net Change 2011-31</b>
B1a	60.5	57.8	59.7	61.0	62.1	1.6
B1b	2.4	2.8	2.9	2.9	3.0	0.6
B1c	15.5	14.5	14.6	14.2	13.7	-1.8
B2	133.1	114.9	110.4	106.1	101.7	-31.3
B8	141.1	116.4	118.0	118.8	118.4	-22.8
<b>Total</b>	<b>352.6</b>	<b>306.3</b>	<b>305.6</b>	<b>303.0</b>	<b>298.9</b>	<b>-53.7</b>

*Units: ha Source: Durham University*

**Table 19: Land Requirement Projections – Upper Scenario**

<b>Use Class</b>	<b>2011</b>	<b>2016</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>	<b>Net Change 2011-31</b>
B1a	60.5	59.4	62.5	64.8	66.9	6.4
B1b	2.4	2.8	3.0	3.1	3.2	0.8
B1c	15.5	14.9	15.2	15.1	14.8	-0.7
B2	133.1	118.2	115.5	112.6	109.6	-23.4
B8	141.1	119.7	123.4	126.1	127.6	-13.6
<b>Total</b>	<b>352.6</b>	<b>315.0</b>	<b>319.6</b>	<b>321.7</b>	<b>322.1</b>	<b>-30.5</b>

*Units: ha Source: Durham University*

**Table 20: Land Requirement Projections – Policy Scenario**

<b>Use Class</b>	<b>2011</b>	<b>2016</b>	<b>2021</b>	<b>2026</b>	<b>2031</b>	<b>Net Change 2011-31</b>
B1a	60.5	59.5	62.7	65.2	67.4	6.9
B1b	2.4	2.8	3.0	3.1	3.3	0.9
B1c	15.5	14.9	15.3	15.2	15.0	-0.5
B2	133.1	118.6	116.1	113.5	110.7	-22.4
B8	141.1	119.9	123.7	126.5	128.1	-13.0
<b>Total</b>	<b>352.6</b>	<b>315.8</b>	<b>320.9</b>	<b>323.5</b>	<b>324.4</b>	<b>-28.2</b>

*Units: ha: Source Durham University*

The final table shows the change in land requirements between 2014 and 2031. This provides an estimate of demand from the present time over the remainder of the projection horizon to 2031.

**Table 21: Changes in Land Requirement Projections between 2014 and 2031**

Use Class	Scenario			
	Baseline	Lower	Upper	Policy
B1a	5.1	3.6	7.7	8.1
B1b	0.3	0.3	0.5	0.5
B1c	-0.3	-0.6	0.3	0.4
B2	-13.3	-15.6	-9.1	-8.2
B8	4.4	1.7	9.4	9.9
<b>Total</b>	<b>-3.7</b>	<b>-10.7</b>	<b>8.8</b>	<b>10.8</b>

*Units: ha Source: Durham University*

The projections for floorspace and employment set out in the preceding sections are based on the assumptions previously noted in Table 12 for density factors and at the start of Section 5.4 for plot ratios. There are two implicit assumptions in the approach that has been used. First, that demand for employment space is directly determined by employment and, second, that the density factors and plot ratios will remain unchanged for the next 20 years.

In the context of the decline in demand between 2011 and 2012, the first assumption implies that every job lost reduces the demand for floorspace and land. Over relatively short timescales, this is not necessarily the case, particularly in the B use classes. At the level of individual factories, warehouses and similar, owners may reduce levels of employment in response to economic conditions but, generally, the employment space that is theoretically freed up is not realised in the short term. Owners may hang on to under-utilised space in the hope of improved conditions or may eventually sell and relocate to smaller premises. It is only in cases where there is a complete closure of a facility that the associated space and land are likely to be released within short timescales.

Over the longer term, the inter-relationships between GVA growth, employment growth and productivity growth (previously discussed in Section 3.2) have a bearing on the second implicit assumption. Across the manufacturing sectors as a whole, GVA growth is being driven by productivity growth. Improvements in productivity occur through a variety of means and, in manufacturing in particular, capital investment in machinery can result in the same or greater level of production with less labour. In consequence, just as the amount of GVA per remaining employee increases it is likely that in many instances, so too will the amount of space per remaining employee - contrary to the assumption of constant density factors. This is because space will be required for the machines that replace people. Whilst these factors are perhaps most obvious in manufacturing and the B2 use classes, other sectors and classes are not immune. Self-service machines in banks and retail outlets provide obvious examples elsewhere. For some sectors, therefore, the assumption that density factors will remain constant may be too conservative. In such sectors, the projections set out in this report will tend to err towards the low side.

## Appendix 1 Economic Sectors

### A1.1 Standard Industrial Classification

The Standard Industrial Classification (SIC) is a method of classifying economic activities. Details about SIC, including its relationship to similar classification schemes of the European Union and the United Nations Organisation can be found in relevant ONS publications<sup>21</sup>. It is sufficient to say each statistical unit (broadly a workplace) is classified into one of around 600 *classes*. The classification scheme is hierarchical and the classes are grouped into *groups*, then into *divisions* and finally into 21 *sections* at the top level of the hierarchy. Both the current and previous study are based on SIC divisions and, because the divisions are always given a 2-digit numerical code, they are often referred to as SIC 2-digit codes.

The current version of the SIC is SIC 2007 and became available for use on 1 January 2008. The preceding version of the classification was SIC 2003 and its predecessor was SIC 1992. The statistical products from ONS mainly adopted SIC 2007 from around 2010/11 onwards. Following this, the users of ONS data, also made the transition to the new version.

In SIC 2007 there are 88 divisions. A full list of these divisions and their 2-digit codes is provided in Table A2, below.

### A1.2 Cambridge Econometrics Data

The economic projections provided by Cambridge Econometrics (CE) are based on a scheme of 45 economic sectors. Economic and employment data were provided for each of these sectors which are based on the divisions of SIC 2007. In some cases, a single SIC division corresponds to a single sector within CE's scheme. For example, SIC 2007 division 19 (Manufacture of coke and refined petroleum products) corresponds to the CE's 7th sector (CE07), which is simply labelled "Coke & Petroleum". In other cases, several SIC divisions combine to form a single CE sector. For example CE03, labelled "Food, Drink & Tobacco" comprises 3 SIC 2007 divisions: division 10 (Manufacture of food products), division 11 (Manufacture of beverages) and division 12 (Manufacture of tobacco products).

A list of the CE sectors and their correspondence to SIC 2007 divisions is provided in Table A1, below.

### A1.3 Reporting sectors

The previous study was based on the divisions of SIC 2003. The study was based on a primary set of 26 sectors which were formed from the divisions of SIC 2003. These 26 sectors were grouped into a set of 12 for reporting purposes. Although the brief for the present study specifically identified retention of the previous study's 12 and 26 sector groupings, differences between SIC 2003 and SIC 2007 make this a less than straightforward exercise

ONS has published data which provide conversion factors for estimating SIC 2003 values from SIC 2007 and *vice-versa*. Using these factors, it is possible to convert CE's 45 sectors into the 12/26 sectors of the previous study. However, analysis indicates that less than half of the CE sectors map completely onto the 12/26 sector groups of the previous study. As a result, continued use of the 12/26 sector groupings would require the data for the majority of CE's sectors to be split amongst the sectors of the previous study. In many cases, the factors involved are within a few percentage points of either 100% or 0% and in these cases, it would be reasonable to adopt a simplifying approximation by rounding up to 100% and down to

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<sup>21</sup> For example

ONS (2009) *UK Standard Industrial Classification of Economic Activities 2007 (SIC 2007) – Structure and explanatory notes*

downloadable from <http://www.ons.gov.uk/ons/guide-method/classifications/current-standard-classifications/standard-industrial-classification/index.html>

0%. However, even after such an approach is applied, there are still 7 of CE's 45 sectors where some splitting into the previous study's sectors would be required.

In discussion with Council Officers, the merits of applying ONS' factors were discussed. It was clear from this discussion that the Council's primary requirements were to maintain a consistency of approach with the previous study in terms the estimates of employment floorspace and land. The previous study's sectors were less important from the perspective of being able to compare the two studies *at sector level* in terms of their respective GVA and employment projections. As a result the Council agreed that, for reporting the present study, use would be made of a set of 13 sectors with each of these sectors being formed from one or more of the sectors in CE's 45 sector scheme. The definition of these reporting sectors is contained in Table A3, below.

Sectors which share an identical name to those of the previous study are reasonably closely matched. The main differences are

- waste has been added to the previous Energy, Water and Quarrying sector
- the new sector of Information and Communication comprises communication activities previously in Transport and Communication, IT services previously in Business Services and media production activities previously included in Hotels, Restaurants and Recreation
- veterinary services are moved from Public Services to Business Services
- travel agency services has moved from Transport and Communication to Business Services

These differences reflect the changes made in SIC 2007 and reflected in the CE 45 sector scheme.

For the floorspace and land calculations, use has been made of the ONS factors. The original study was based on a mapping from SIC 2003 divisions to use classes. This same mapping has been retained but has been converted by use of the ONS factors to an equivalent mapping from CE's 45 sectors to use classes. Appendix 2 provides more details.



## A1.4 Tables

**Table A1: Cambridge Econometrics 45 Sector Scheme**

<b>Sector</b>	<b>Name</b>	<b>SIC 2007 Division</b>	<b>Sector</b>	<b>Name</b>	<b>SIC 2007 Division</b>
CE01	Agriculture , forestry & fishing	01-03	CE24	Land transport	49
CE02	Mining & quarrying	05-09	CE25	Water transport	50
CE03	Food, drink & tobacco	10-12	CE26	Air transport	51
CE04	Textiles etc	13-15	CE27	Warehousing & postal	52-53
CE05	Wood & paper	16-17	CE28	Accommodation	55
CE06	Printing & recording	18	CE29	Food & beverage services	56
CE07	Coke & petroleum	19	CE30	Media	58-60
CE08	Chemicals	20	CE31	IT services	61-63
CE09	Pharmaceuticals	21	CE32	Financial & insurance	64-66
CE10	Non-metallic mineral products	22-23	CE33	Real estate	68
CE11	Metals & metal products	24-25	CE34	Legal & accounting	69
CE12	Electronics	26	CE35	Head offices & management consultancies	70
CE13	Electrical equipment	27	CE36	Architectural & engineering services	71
CE14	Machinery	28	CE37	Other professional services	72-75
CE15	Motor vehicles	29	CE38	Business support services	77-82
CE16	Other transport equipment	30	CE39	Public Administration & Defence	84
CE17	Other manufacturing & repair	31-33	CE40	Education	85
CE18	Electricity & gas	35	CE41	Health	86
CE19	Water, sewerage & waste	36-39	CE42	Residential & social	87-88
CE20	Construction	41-43	CE43	Arts	90-91
CE21	Motor vehicles trade	45	CE44	Recreational services	92-93
CE22	Wholesale trade	46	CE45	Other services	94-96
CE23	Retail trade	47			

**Table A2: SIC 2007 Divisions**

01	Crop and animal production, hunting and related service activities	32	Other manufacturing	69	Legal and accounting activities
02	Forestry and logging	33	Repair and installation of machinery and equipment	70	Activities of head offices; management consultancy activities
03	Fishing and aquaculture	35	Electricity, gas, steam and air conditioning supply	71	Architectural and engineering activities; technical testing and analysis
05	Mining of coal and lignite	36	Water collection, treatment and supply	72	Scientific research and development
06	Extraction of crude petroleum and natural gas	37	Sewerage	73	Advertising and market research
07	Mining of metal ores	38	Waste collection, treatment and disposal activities; materials recovery	74	Other professional, scientific and technical activities
08	Other mining and quarrying	39	Remediation activities and other waste management services.	75	Veterinary activities
09	Mining support service activities	41	Construction of buildings	77	Rental and leasing activities
10	Manufacture of food products	42	Civil engineering	78	Employment activities
11	Manufacture of beverages	43	Specialised construction activities	79	Travel agency, tour operator and other reservation service and related activities
12	Manufacture of tobacco products	45	Wholesale and retail trade and repair of motor vehicles and motorcycles	80	Security and investigation activities
13	Manufacture of textiles	46	Wholesale trade, except of motor vehicles and motorcycles	81	Services to buildings and landscape activities
14	Manufacture of wearing apparel	47	Retail trade, except of motor vehicles and motorcycles	82	Office administrative, office support and other business support activities
15	Manufacture of leather and related products	49	Land transport and transport via pipelines	84	Public administration and defence; compulsory social security
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	50	Water transport	85	Education
17	Manufacture of paper and paper products	51	Air transport	86	Human health activities
18	Printing and reproduction of recorded media	52	Warehousing and support activities for transportation	87	Residential care activities
19	Manufacture of coke and refined petroleum products	53	Postal and courier activities	88	Social work activities without accommodation
20	Manufacture of chemicals and chemical products	55	Accommodation	90	Creative, arts and entertainment activities
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	56	Food and beverage service activities	91	Libraries, archives, museums and other cultural activities
22	Manufacture of rubber and plastic products	58	Publishing activities	92	Gambling and betting activities
23	Manufacture of other non-metallic mineral products	59	Motion picture, video and television programme production, sound recording and music publishing activities	93	Sports activities and amusement and recreation activities
24	Manufacture of basic metals	60	Programming and broadcasting activities	94	Activities of membership organisations
25	Manufacture of fabricated metal products, except machinery and equipment	61	Telecommunications	95	Repair of computers and personal and household goods
26	Manufacture of computer, electronic and optical products	62	Computer programming, consultancy and related activities	96	Other personal service activities
27	Manufacture of electrical equipment	63	Information service activities	97	Activities of households as employers of domestic personnel
28	Manufacture of machinery and equipment n.e.c.	64	Financial service activities, except insurance and pension funding	98	Undifferentiated goods- and services-producing activities of private households for own use
29	Manufacture of motor vehicles, trailers and semi-trailers	65	Insurance, reinsurance and pension funding, except compulsory social security	99	Activities of extraterritorial organisations and bodies
30	Manufacture of other transport equipment	66	Activities auxiliary to financial services and insurance activities		
31	Manufacture of furniture	68	Real estate activities		

**Table A3: Reporting Sector Definitions**

<b>Sector</b>	<b>Constituent CE sectors</b>
Agriculture, Forestry and Fishing	CE01
Energy, Water, Waste and Quarrying	CE02, CE07, CE18, CE19
Manufacturing 1	CE04-06, CE08-11, CE14
Manufacturing 2	CE12, CE13, CE15, CE17
Construction	CE20
Wholesale and retail trade	CE21-23
Hotels, restaurants and recreation	CE28, CE29, CE43, CE44
Transport	CE16, CE24-27
Information and Communication	CE30, CE31
Finance	CE32
Business Services	CE33-38
Public Services	CE39-42
Other services	CE45

## Appendix 2 Economic Sectors and Use Classes

The land use projections in the 2010 study drew on earlier work undertaken by consultants GHK for former regional organisations<sup>22</sup>. This earlier work defines a mapping between economic sectors and use classes, with the former based on the 2-digit Divisions of SIC 2003<sup>23</sup>. In around half of the Divisions, employment is split across two or more use classes. The mapping underlying the 2010 study's land use projections is set out in Table A4, below.

**Table A4: Mapping from SIC 2003 Divisions to Use Classes**

Use Class	Description	SIC 2003 Divisions
A1	Shops	52(33%),72(10%)
A2	Professional and Financial Services	52(33%),65(50%),66(50%),67(50%),71(90%),72(45%),91(90%),92,93(90%)
A3	Restaurants/cafes	55(80%)
B1a	Offices (other than A2)	40(30%),41(30%),45(33%),52(33%),65(50%),66(50%),67(50%),70,71(10%),72(45%),74,75,80(10%),85(15%),90(30%),91(10%),93(10%)
B1b	R&D	30(25%),31(25%),32(25%),33(25%),73
B1c	Other industrial <sup>24</sup>	30(75%),31(75%),32(75%),33(75%)
B2	General industry not in B1	10(30%),11(30%),15,16,17,18,19,20,21,22,23,24,25,26,27,28,29
B8	Storage/distribution centres	50(60%),51(60%),60,61,62,63,64
C1	Hotels/boarding houses	55(20%)
Other		01,02,05,10(70%),11(70%),13,14,40(70%),41(70%),45(67%),80(90%),85(85%),90(70%)

Source:GHK/2010 Study

Embedded within Table A4 are the assumptions incorporated within the 2010 study. These include: the assumptions that agriculture and certain extractive industries do not directly give rise to demand for employment space and land; and the assumptions that only a proportion of employment in utilities, construction, education and health requires employment space in the use classes listed.

The change from SIC 2003 to SIC 2007 means that the relationships in Table A4 cannot be used directly in converting the employment projections of the present study into land use projections. Instead, these relationships have been converted from SIC 2003 to SIC 2007 using conversion factors published by ONS. These factors were previously noted in Appendix 1 in the context of the reporting sectors chosen for this report. The key point to note here is that these conversion factors were derived by ONS on the basis of a very large national sample from 2009. The assumption made in applying them in the present exercise is that they are also representative in the much smaller economy of Northumberland.

The alternative approach is to directly develop a mapping from SIC2007 Divisions to use classes from scratch. However, in the absence of appropriate detailed knowledge, data and resources for this, pursuit of this alternative risks adding much more distortion to the relationships in Table A4 than the application of

<sup>22</sup> GHK (April 2009) *North East Business Accommodation Project Baseline Report (report for One North East and North East Assembly)*

<sup>23</sup> The GHK report defines two mappings: one between SIC 2003 Divisions and a set of 28 "sector groupings" (Table 4.5, p27) and a second between these sector groupings and use classes (Appendix A, p59). The two mappings can be combined to produce an overall mapping between SIC 2003 Divisions and use classes as shown in Table A4

<sup>24</sup> Suitable for location in a residential area

the ONS' conversion factors. Since comparability of projections with the 2010 study is desirable, this alternative approach was not pursued.

Once the conversion to SIC 2007 is made, the final step is to convert the mapping between economic sectors and use classes to the 45 sectors used in CE's projections. The results of this process are set out in Table A5, below.

**Table A5: Mapping from Economic Sectors to Use Classes**

<b>Use Class</b>	<b>Economic Sector (CE 45 sector scheme)</b>
A1	CE23(33%),CE31(9%)
A2	CE23(33%),CE30(19%),CE31(41%),CE32(50%),CE38(17%),CE43,CE44,CE45(90%)
A3	CE28(80%),CE29(80%)
B1a	CE18(30%),CE19(25%),CE20(40%),CE23(33%),CE31(41%),CE32(50%),CE33,CE34,CE35,CE36,CE37(73%),CE38(68%),CE39,CE40(10%),CE41(15%),CE42(15%),CE45(10%)
B1b	CE12(25%),CE13(20%),CE17(7%),CE37(13%)
B1c	CE12(75%),CE13(60%),CE17(21%)
B2	CE02(26%),CE03,CE04,CE05,CE06,CE07,CE08,CE09,CE10,CE11,CE13(20%),CE14,CE15,CE16,CE17(72%),CE19(16%),CE21(40%),CE22(40%),CE30(81%)
B8	CE21(60%),CE22(60%),CE24,CE25,CE26,CE27,CE31(10%),CE38(12%)
C1	CE28(20%),CE29(20%)
Other	CE01,CE02(74%),CE18(70%),CE19(60%),CE20(60%),CE37(14%),CE38(2%),CE40(90%),CE41(85%),CE42(85%)

*Source:Durham University*