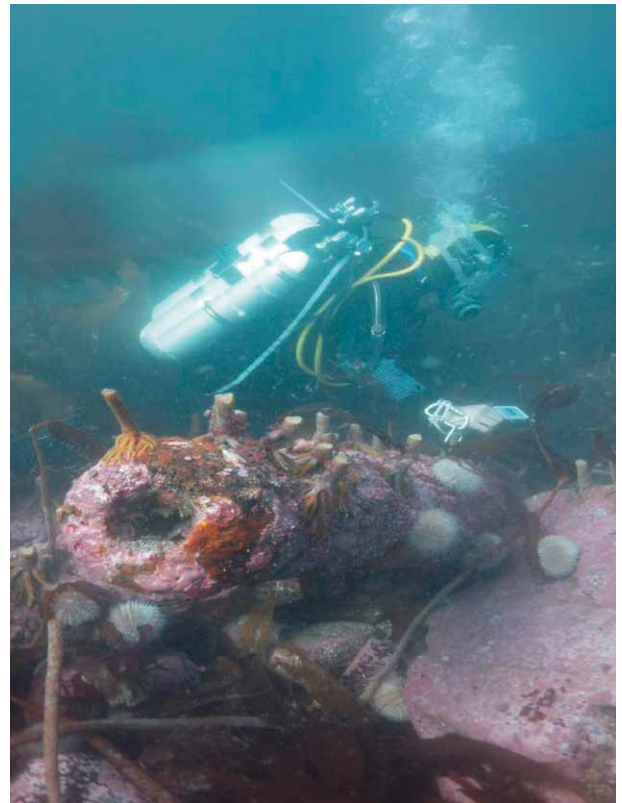




Historic England

Facing the Future: Foresight and the Historic Environment



1	Introduction.....	3
1.1	First principles.....	3
1.2	How we use it	4
2	Drivers	6
2.1	Population	6
2.1.1	Growth.....	6
2.1.2	Demographic profile	8
2.2	The environment.....	11
2.3	The economy	12
2.4	Governance and civil society	13
2.5	Technology and innovation.....	15
3	Implications.....	19
3.1	Regulation and environmental land management	19
3.2	Development.....	21
3.2.1	Settlement pattern and form	21
3.2.2	Housing.....	23
3.2.3	Infrastructure	24
3.3	Landscape and resource exploitation	26
3.3.1	Agriculture	26
3.3.2	Woodland and forestry	30
3.3.3	Minerals.....	31
3.4	The environment.....	33
3.4.1	Flooding.....	34
3.4.2	Coastal change.....	34
3.4.3	Temperature change.....	35
3.4.4	Water availability.....	35
3.4.5	Biogeography: distribution of animals, plants and pathogens	35
3.4.6	Indirect impacts	36
3.5	The marine environment.....	37
3.6	Economic growth	39
3.7	Information and social networking.....	41
3.8	Identity and values.....	42
3.9	Professional skills.....	44
4	Responses	48
4.1	Development.....	48
4.1.1	Housing.....	50
4.1.2	Infrastructure	50
4.2	Landscape and resource exploitation	50
4.2.1	Settlement pattern and form	50
4.2.2	Agriculture	51
4.2.3	Woodland and forestry	52
4.2.4	Minerals.....	52
4.3	The environment.....	52
4.4	The marine environment.....	53
4.5	Economic growth	54
4.6	Information and social networking.....	54
4.7	Identity and values.....	54
4.8	Professional skills.....	55
5	Preparing for Practical Outcomes	56
5.1	Understanding change: Building the evidence base.....	56

5.1.1	Identity and values	56
5.1.2	Sensitivity and Design	56
5.1.3	Economic and other benefits	57
5.1.4	Analysing Good Trend Data	57
5.2	Conservation and Management	57
5.2.1	Contribution to master planning	58
5.2.2	Ecosystem services	58
5.2.3	Tracking change	58
5.3	Engagement with others	58
5.3.1	Owners and managers	58
5.3.2	Neighbourhood Planning process	59
5.3.3	Digital technologies	59
5.3.4	Marine record	59
5.3.5	Significance	59
5.4	Skills and capacity building	59
5.4.1	Labour Market Intelligence	60
5.4.2	Developing understanding in allied sectors	60
5.4.3	Identifying opportunities	60
5.5	Advocacy and influence	60
5.5.2	Contribution to Economic growth	61
5.5.3	Managers of change	61
	Conclusion	63

Executive Summary

‘Plan ahead or find trouble on the doorstep’ *Confucius*

Protecting a nation’s heritage is a continuous and long term venture. As government’s national advisor on the historic environment, Historic England ¹ carries a responsibility to be expert and well prepared to serve best the needs of the physical remains of the past. In line with Government, industry and commerce, we are taking more sophisticated approaches to long term planning, and the tools developed to assist with structuring this are now recognised as the discipline of Foresight.

Foresight was recognised in the first iteration of the National Heritage Protection Plan (NHPP)² as a sector-wide tool, and was itself used to assess its priorities. The NHPP Action Plan facilitated approaches to Foresight that will feed information and intelligence into future corporate planning. In practice Foresight is a long term, continuous impact assessment that enables Historic England and the historic environment sector to be more prepared for change.

In this report we attempt to articulate the process of research and evidence gathering that is the key to the strategic, long term approach to heritage protection that in turn underpins robust policy and resilience in the organisation. We draw from a wide range of horizon-scanning and Foresight activities undertaken by government departments, agencies, international bodies and commercial organisations. We aim to identify the areas in which Historic England can most make a difference and direct resource to protecting our historic environment.

Section 1 introduces the first principles of Foresight and how we, as an organisation use it. Section 2 explains how we have identified what we consider to be the key overarching or macro drivers impacting the historic environment. Section 3 examines the implications of these drivers, via a range of more detailed cross cutting themes, and articulates their tangible effect on the historic environment. Following on from this, sections 4 and 5 set out some initial considerations about active, planned and possible responses to the risks and opportunities identified, and the mechanisms for those responses. This process offers the benefits of more refined Foresight to the development of the new Heritage 2020³ and the direction of Historic England’s resources.

April 2015

¹ At the beginning of April 2015 English Heritage reorganised into a Charitable Trust (retaining the name *English Heritage*) and a heritage agency providing advice to Government (called *Historic England*). References to English Heritage relate to work undertaken or commissioned prior to this reorganisation.

² <http://www.historicengland.org.uk/images-books/publications/nhpp-plan-framework/>

³ <http://www.theheritagealliance.org.uk/historic-environment-forum/heritage2020>

1 Introduction

1.1 First principles

Foresight, sometimes known as ‘futures research’ is a discipline increasingly used by both private and public sector bodies. It encompasses an array of techniques but is essentially a strategic tool used to gather, maintain and use sector intelligence. It is deployed to spot trends in available or gathered information and develop them into a range of possible scenarios beyond the usual three to five year corporate cycle. It is widely used to improve long term outcomes in a fast changing world and at its most successful it can also foster innovation and opportunity.

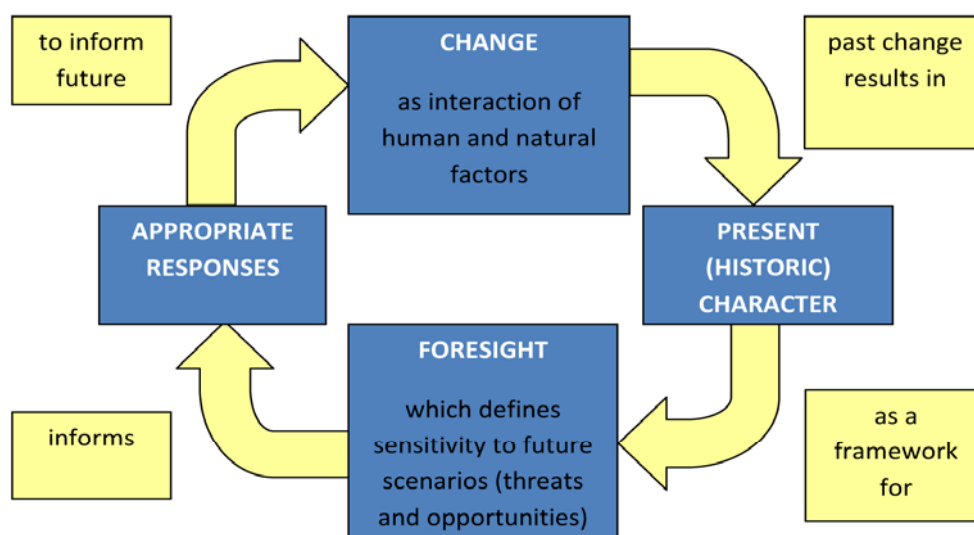
Using Foresight at a relatively simple level, the technique of Horizon Scanning is arguably of most relevance to Historic England. Horizon Scanning is a knowledge ‘radar’ devoted to the systematic search for potential developments in a given subject area, with the emphasis on those changes at the periphery of our current thinking. It is in effect, an early warning system for the strategist or policy maker. It can spot trends and emerging threats or opportunities that might be just out of reasonable sight by using information gathered from intelligence sources (for example data, statistics, research, stakeholder and peer review, popular or media information). Historic England has adopted the methodology to maintain a credible, current, evidence based voice in debates about the historic environment.

Government practice has recently been reviewed in order to establish ‘how best to enable effective, shared, strategic analysis across government on the future challenges facing the United Kingdom (UK)⁴. As this review establishes effective intelligence and Foresight as essential elements of sector planning, it is important that the heritage sector recognises its potential and equips itself to play a full and active role. Historic England is developing that expertise by applying Foresight to the historic environment in order to keep in step with recognised government approaches. Both our advice on protecting the historic environment and the influence and resilience of the organisation itself depend in part upon demonstrable, evidence based approaches.

If we can at an early stage, anticipate the kinds of threats and opportunities that our historic environment will face in the future we should be able to organise and equip ourselves to respond better and sooner. In some cases, early awareness and prompt action may enable us to avert or minimise a threat, or capitalise on an opportunity; in others we can at least better manage the consequences of change that cannot be avoided.

⁴<https://www.gov.uk/government/publications/review-of-cross-government-horizon-scanning>;
<http://www.publications.parliament.uk/pa/cm201314/cmselect/cmsctech/703/70306.htm>

For the heritage sector, the overarching influences (or drivers) are population, environment, economy, governance and civil society and technology and innovation; and while Foresight will not change the uncertainty they create, it can enable a more strategic vision of the future and is a powerful means of preparing for them, and thus securing better protection outcomes



Rather than seeing the present landscape as fixed in time, a historical perspective can enable the present landscape, and local character, to be understood as the result of past change and the framework for identifying their sensitivity to future scenarios for change.

Figure 1: An example of a simple Foresight model Copyright J Lake 2014

1.2 How we use it

There are many methodologies and modelling systems within the overarching Foresight discipline including backcasting, horizon scanning, road mapping, and scenario planning. Within Historic England, Foresight is used formally and informally by teams and individuals and can be measured by successful knowledge sharing across teams and departments so all of us can use the embedded intelligence. This collaborative working is coordinated by the Historic Environment Intelligence (HEI) Team. Its remit is to work in partnership with colleagues across the organisation and the wider sector, in assimilating intelligence and data on developing trends and examine their potential impact on England's historic environment. The team is in a position to be able to generate, assess and facilitate the sharing of intelligence that will inform protection outcomes implemented by other internal departments and our sector partners.

In order to do this successfully, the Foresight must be rooted in or triggered by a need to develop strategic thinking on a particular issue, irrespective of where this originates. We have developed two main products to enable a proportionate and transparent approach to intelligence gathering.

- Horizon scans act as a marker that an issue has been raised and provides background information, an evaluation of the level of threat or opportunity, and a recommendation for next steps, including: take no action; maintain a watching brief; or recommend a more detailed assessment of the issue.
- Assessment reports take this a step further through research and/or intelligence gathering to develop and articulate a fuller picture of the issue and again make recommendations for a further response.

Their influence is fourfold. To stimulate debate across the wider sector; to inform future iterations of the NHPP; to influence organisational behaviours, and to ensure timely responses to emerging issues.

To produce this document, the Historic Environment Intelligence Team (HEIT) first undertook a baseline scanning and an Outputs Relationship Mapping⁵ exercise to start to identify the key drivers of change affecting the historic environment. We followed this up with an in-house Drivers Analysis and a STEEP⁶ analysis.

⁵ Outcomes Relationship Mapping is a technique for exploring how the world may be different as a result of an initiative. It provides a strategic view of an initiative and has many other uses. Copyright Myles McClelland, 2013

⁶ Social, Technological, Environmental, Economic, Political – This is one of a range of acronyms such as STEP, STEEP, STEEPV or PESTLE which provide a framework for considering the drivers and their trends.

2 Drivers

By 'drivers', we mean the larger forces driving change across the world. Drivers are highly complex and this articulation of them is purposefully a summary, highlighting the key aspects only. It will become apparent over the next two sections, that these drivers do not exist in isolation, but have some influence on each other. By identifying how they impact on issues at more refined scales of resolution it is possible to see how these macro level issues sit behind both existing and future implications (or risks and opportunities). Once this is understood, it is possible to draw some conclusions about the directions of the different drivers and examine the possible impacts on the historic environment.

These considerations are set out in section 3 where we identified some cross-cutting themes under which headings the implications are considered. These headings sit below the high level macro drivers explained in this section and articulate the link between them and the historic environment. These cover the areas of regulation and environmental land management, development pressure, landscape and resource exploitation, the environment, the marine environment, economic growth, information and social networking, values and identity, and professional skills.

All of the drivers we identified as having an impact on the historic environment are part of the trends that can collectively be described as 'globalisation'. One useful definition of globalisation is provided by Anthony Giddens:

Globalisation can thus be defined as the intensification of worldwide social relations which link distinct localities in such a way that local happenings are shaped by events occurring many miles away and vice versa.⁷

The notion of globalisation emphasises the need to see local events and situations in a wider context because they are increasingly closely linked, and has arguably created the need for Foresight based approaches to cope with the pace and complexity of change. By definition therefore it permeates almost every driver discussed below.

2.1 Population

2.1.1 Growth

The global population has been characterised by phenomenal growth in the last 50 years approximately doubling in size.⁸ Currently about 7.1 billion,⁹ the global population is predicted to reach 9.6 billion by 2050¹⁰ with commensurate pressure on world resources, energy, society and infrastructure. Globally, the rate of increase is

⁷ A Giddens 1991 *The consequences of Modernity* Cambridge Polity Press p 64

⁸ www.imf.org/external/pubs/ft/famed/2006/09/picture.htm and www.bbc.co.uk/news/world-15391515

⁹ <http://eas.un.org/unpd/wpp/>,

¹⁰ www.esa.un.org/unpd/wpp/Document_P2012_Press_Release.pdf (UN press release 13 June 2013 11am)

likely to be highly variable with the biggest areas of expansion expected to be in parts of Africa and Asia creating very large countries with over 1 billion inhabitants and many large countries with 200 million inhabitants.¹¹

It is projected that the UK population, currently approximately 63.7¹² million will reach 73.3 million by mid-2037, a total increase of 9.6 million or 13% over 25 years. The reason behind this increase is three fold: the assumed number of births; the overall increase in longevity (which in combination account for the natural increase); and net migration. Within the UK, England is likely to experience the sharpest rise, reaching a population of 62.2 million by 2037.¹³ Although trends are commonly discussed in terms of expansion, after this date the anticipated reductions in natural change (birth rates) are not expected to be counter-balanced by migration, and population decline across Western Europe is anticipated.¹⁴ That this could lead to a changing world balance (with regard to labour and market forces) is suggested by the expectation that Europe's proportion of the global population will most likely reduce by half by 2100.

Currently 1 in 33 people are global migrants,¹⁵ with economic migration being the largest growth group and the proportion of women migrating increasing significantly (a two fold increase from 1960 to 2000).¹⁶ The UK itself has a long tradition of migration and 43% of the 9.6 million projected increase to the UK population is expected to be attributable to net inward migration and within this the geography of international migration is also shifting. Of the remaining 57% resulting from natural increase, 21% is attributable to the effect of net migration, that is, birth rates within migrant groups.¹⁷ This demonstrates the continuing and evolving change of the profile of English society, in turn impacting on national, local and individual concepts of identity.

The UK also has relatively high internal migration, which changes the distribution of that society, with 2.9 million people moving between local authority regions in the year ending June 2012. Current trends show a loss to many northern areas and significant population gains to the south and east: London, the South East and East of England accounted for 53% of UK population growth in 2012.¹⁸ The South East has the

¹¹ For example, India to overtake China and Nigeria to overtake the US in size by population.

¹² <http://www.ons.gov.uk/ons/rel/pop-estimate/population-estimates-for-uk--england-and-wales--scotland-and-northern-ireland/mid-2011-and-mid-2012/index.html>, which was released 08 August 2013

¹³ ONS National Population Projections, 2012-based Statistical Bulletin, UK, 06 November 2013

¹⁴ A decline of 14% in Europe's population by 2100 is projected by the UN: see www.esa.un.org/unpd/wpp/Document_P2012_Press_Release.pdf (UN press release 13 June 2013 11am)

¹⁵ An increase from 1 in 35 since 2000 (source International Organisation for Migration at www.iom.int)

¹⁶ Currently running at about 49% of all international migrants (source United Nations Department of Economic and Social Affairs, Population Division (2008) *Trends in International Migrant Stock: the 2008 revision* (United Nations database, POP/DB/MIG/Stock/Rev.2008 via www.esa.un.org)

¹⁷ ONS National Population Projections, 2012-based Statistical Bulletin, UK, 06 November 2013

¹⁸ www.ons.gov.uk, population change, mid 2012 release 08 Aug 2013 summary.

largest positive net difference in the country with an estimated 24,300 more people moving into the region from elsewhere in the UK than leaving.¹⁹

2.1.2 Demographic profile

It is clear that the demographic profile of England continues to change, resulting directly from these global and national changes. The reality of changing demographics is that they are varied and often uncertain but within the UK there are some identifiable trends; the age profile of the population; the diversity of the population; and its faith profile.

By comparison with other European Union (EU) countries the UK will be the least aged by 2035, and England will be the least aged of the four UK constituent countries. Despite this, by 2020 one fifth of the UK's population will be over 65 and by 2037 the number of people over 80 in the UK will have doubled, resulting in 1 in 12 people being over 80.²⁰ By 2061 those over 65 will account for 26% of the UK population.

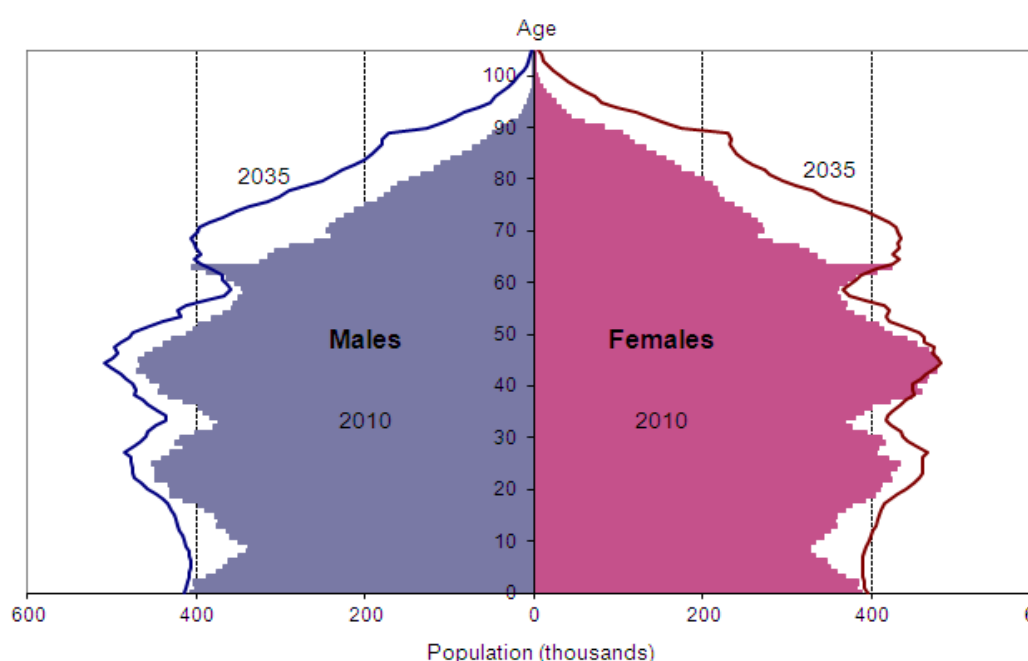


Figure 2: Estimated and projected age structure of the United Kingdom population, mid-2010 and mid-2035 (http://www.ons.gov.uk/ons/dcp171780_240701.pdf)

At a national level, an ageing population is cited as placing the most pressure on public finances. Age-related public spend is certainly set to increase, and, in combination with stable revenues, threatens to impact significantly on deficit figures. Various predictions exist but the Office of Budget Responsibility (OBR) suggests public spending (other than debt interest) will rise from 35.6 % of Gross Domestic product (GDP) in 2016/7 to 40.8% of GDP by 2060/61, and that the main drivers for the increase are on age-related spend. At the same time it is predicted that the old age dependency ratio will almost double. Local Authorities predict that the impact of

¹⁹ ONS Internal Migration by Local Authorities in England and Wales, Year Ending June 2012 26 June 2013

²⁰ ONS National Population Projections, 2012-based Statistical Bulletin, UK, 06 November 2013

spend on social care (the majority of which goes on adult care) is likely to rise from 40% of their budgets to 60% by 2019/20 (though this is also influenced by falling total budgets).²¹ Current patterns for fertility rates and family size (that is, that the latter will average 1.89 children per woman for women born in 2005) suggest no radical change to this situation; although the balance between men and women (currently 105 boys born for every 100 girls) suggests a gradual increase in the male population.²² These, along with other factors such as life expectancy are regionally variable and will have local impact.

There are over eleven million people with a limiting long term illness, impairment or disability in UK and the most commonly-reported impairments are those that affect mobility, lifting or carrying.²³ The prevalence of disability also rises with age. Around 6 per cent of children are disabled, compared to 16 per cent of working age adults and 45 per cent of adults over State Pension age in UK.²⁴ Therefore there is also a link between possible increases in the percentage of people with disabilities as the population ages overall. People with disabilities are also less likely to visit cultural sites and take part in Leisure and sporting activities than non-Disabled people,²⁵ and constitute an under-represented group in society in general.²⁶

England continues to get steadily more ethnically diverse. In 2001, 7.9% of the population comprised ethnic minorities. This figure had risen to 14% by 2011. Indian and Pakistani ethnic groups remain the largest accounting jointly for 4.5% of the population.²⁷ This shift in the make-up of the population is having a profound impact on the country's identity and culture and this effect is the subject of national, and often controversial debate. Ethnic diversity is geographically uneven with high concentrations in London, the West Midlands, Manchester and West Yorkshire.²⁸ Although often perceived as an inner-city phenomenon, internal migration in the suburbs now attracts a higher than average proportion of residents from outside the UK, as well as being the focus of ethnically varied internal migration patterns. A

²¹ www.local.gov.uk/publications/-/journal_content/56/PUBLICATION (Local Government Association: Funding outlook for councils from 2010/11 to 2019/20: preliminary modelling published 26 June 2012, p.10)

²² ONS: <http://www.ons.gov.uk/ons/rel/npp/national-population-projections/2012-based-reference-volume-series-pp2/fertility.html>

²³ Family Resources Survey 2011/12. Source: Office for Disability Issues <http://odi.dwp.gov.uk/disability-statistics-and-research/disability-facts-and-figures.php#gd>

²⁴ Source: Source: Family Resources Survey 2010/11; Source: Office for Disability Issues. <http://odi.dwp.gov.uk/disability-statistics-and-research/disability-facts-and-figures.php#gd> State Pension age changed from 2010/11 and so the definition of State Pension age and Working age is not consistent over time.

²⁵ Taking Part Survey 2011/12. Source: Office for Disability Issues <http://odi.dwp.gov.uk/disability-statistics-and-research/disability-facts-and-figures.php#gd>

²⁶ The only substantive piece of work on disability and the historic environment has been carried out by English Heritage at <http://www.historicengland.org.uk/research/inclusive-heritage/disability-history/>

²⁷ www.ons.gov.uk/ons/dcp171776290588.pdf (Ethnicity and National Identity in England and Wales 2011, 11 December 2012)

²⁸ Local authority level breakdowns by the ONS give detailed pictures showing variations and concentrations of ethnic diversity even within these areas.

further consideration is that surveys confirm that fewer people from Black, Asian Minority Ethnic (BAME) backgrounds engage with heritage both as visitors and in the workforce

Part of the increasing diversity of England is witnessed through the profile of faith communities. The 20th century has seen unparalleled changes in the breadth of faiths adhered to in England. The 2011 census data provides evidence of significant shifts in religion and belief: Christianity was the largest religious group in England and Wales with 33.2 million people identifying with the religion. This represented a decrease from 72% to 59% of the usual resident population (since the previous census in 2001). Muslims make up the second largest religious group with 2.7 million people, an increase from 3% to 5% of the population. Hindu, Sikh, Jewish, and Buddhist faiths all recorded an increase since 2001. Significantly, the number of people who reported that they did not have any religion now constitutes 25% of the population, a rise from 5% ten years before.

Population by faith

People in England and Wales by self-described faith, showing % change on 2001

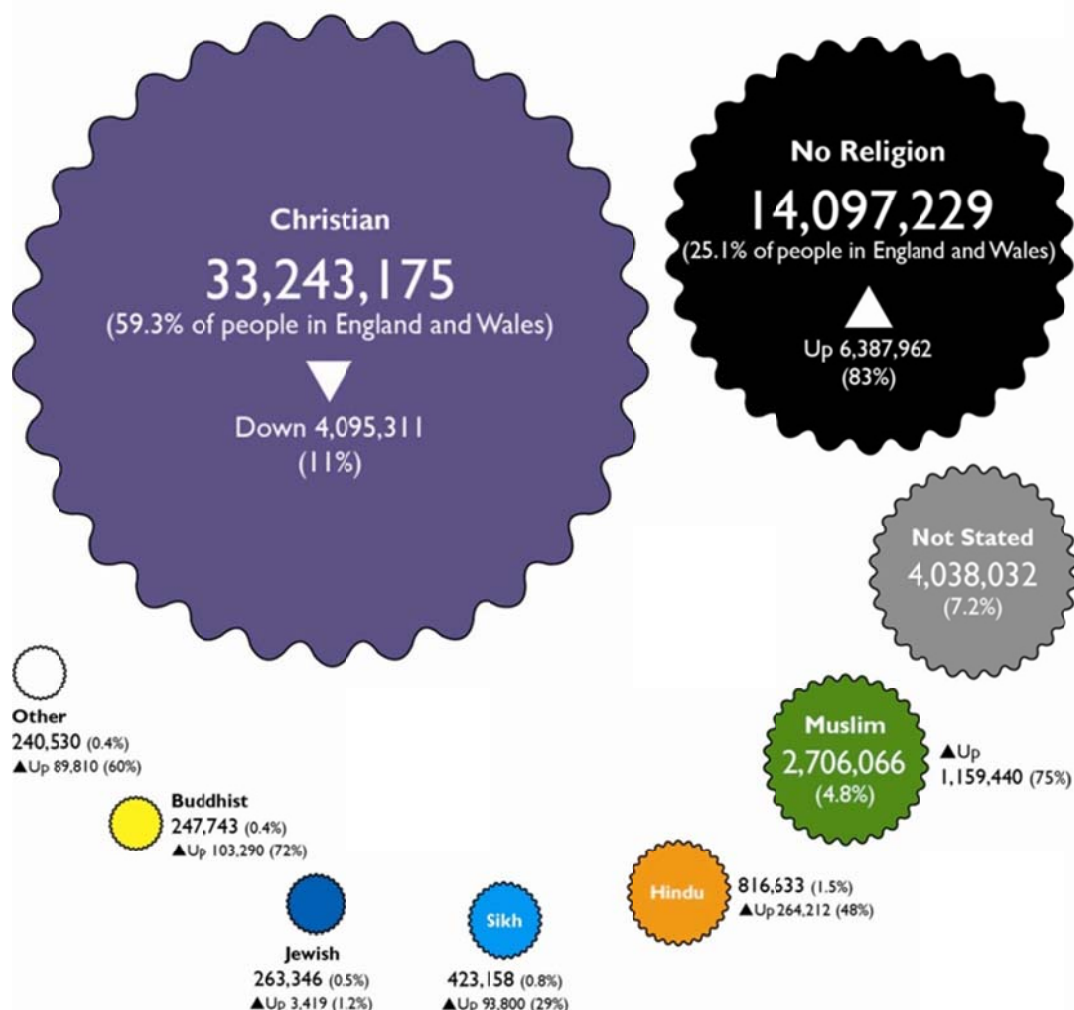


Figure 3: Population by faith, changes between 2001 and 2011. Source Guardian Data Site

This steady, long term shift is often described as indicating secularisation, although some prefer ‘de-Christianisation’ as a more accurate term, but either way it is broadly set to continue. Within this the profile of Christianity is changing; while some church-going figures continue to fall, the areas of evangelical, Pentecostal and independent churches are experiencing a growth surge. The religious profile of England is complex, not just because of its variety of faiths and adherents but by its very nature, at once showing signs of increasing secularism, pluralism and religiosity.

These broad trends represent some key factors that contribute to people's sense of identity, however identity might be significantly affected by other factors such as national identity, sexual identity, family, interests, gender, level of education and employment. Inter-mingled with place-based and cultural affiliations these relate to who we are and what values we ascribe to and therefore are intimately connected to the built and historic environments. Understanding trends and issues in identity and associated values is therefore fundamental to the future of the historic environment.

2.2 The environment

The environment comprises both natural and cultural elements that are, in the UK more than many countries, inextricably linked. Even so, unless rainfall and temperature can be controlled, the range of environmental characteristics is constrained by the prevailing climatic conditions. Small scale micro-climates do exist that allow anomalous habitats and land-use but these are exceptional circumstances. Climate describes the average weather over many years. It is a product of long-term atmospheric behaviour and it informs our general seasonal expectations. In contrast, weather is short-term and what we experience. It comprises events which, though they may have catastrophic effects (the 1953 storm surge; the 1987 hurricane) are a result of short-term atmospheric behaviour. A shift in climate will change the nature and timing of the weather we can expect and will alter a wide range of environmental processes experienced, often by accelerating or intensifying their impact. Yet as well as the risks resulting from climate change, opportunities may also be created, for example through changes in land-use to options that offer greater protection for heritage assets.

Current predictions for climate change in the UK (relative to the 1961-1990 baseline) suggest that by 2080 there will be an increase in the mean summer temperatures for southern England of up to 4.2°C (between 2.2°C and 6.8°C), an increase in mean winter precipitation of up to 33% (or between 9% and 70%) along the western side of the UK, and a decrease in mean summer rainfall volumes of up to 40% (between 65% and 6%), notably in parts of the far south of England.²⁹

²⁹ Jenkins, G. J., Murphy, J. M., Sexton, D. M. H., Lowe, J. A., Jones, P. and Kilsby, C. G. (2009). *UK Climate Projections: Briefing report*. Met Office Hadley Centre, Exeter, UK.

As the figures above highlight, there is significant uncertainty in quantifying the effects of climate change in the medium to long term and predictions will continue to be revised as new data is incorporated and models are refined. For these reasons there is more value in considering trends than quantifying change. The dominant trends identified for the UK are that temperature will continue to rise; winter rainfall will increase as summer rainfall decreases, and extreme precipitation events may increase, affecting heritage assets both on land and at sea (consideration of the marine environment is in section 3).

Overall, the direct impact of climate change is best considered as a ‘risk multiplier’, that is it accelerates changes that are already happening. For example, in the UK, we are already familiar with the fact that flooding and coastal erosion occurs and it is the magnitude, frequency and geography of these processes that climate change will affect. Similarly, we are already aware that changing environmental conditions can alter the distribution of animals, plants and pathogens which may have positive, negative or neutral impacts on the natural and built environment. Whilst the pace of change to process and biogeography may be the subject of debate, the recognition that change itself is occurring is now broadly accepted.

Despite this, there is no consensus on how to mitigate or adapt to climate change. The degree to which projected changes influence the behaviour of government and business varies significantly because it is dependent on market forces³⁰ and ideological position. These indirect impacts (expressed through how energy is produced and regulated; land is managed; investments targeted, and buildings adapted or constructed) are therefore harder to predict. Adaptation policies and plans may be prepared but the commitment to implement these is likely to fluctuate according to current economic strength and actions perceived to best develop economic resilience.

2.3 The economy

Our economic well-being is intrinsically linked to a wide range of socio-political and environmental issues. Whilst surveys and indices of happiness enable perceptions of economic well-being to be measured at an individual level, it is clear that responses are influenced by decisions by government and businesses made at a macro-economic level, such as the supply and demand of different goods and services, the flow of capital, and the movement of people. Indeed, our economic fortunes are inextricably linked to a range of European institutions as well as those with a global reach.

The UK economy has grown by an average of around 2% per annum for over 150 years, through successive periods of boom and bust. The UK’s public debt as a proportion of GDP; has declined from a post war high in 1945 of 240% to figures in the

³⁰ Calderón, F and Stern, N (2013) *The New Climate Economics*. Project Syndicate, Sept 22, 2013. www.project-syndicate.org

range of 30-40% over the subsequent decades. From 2008, an upward trend has emerged and the national debt now stands at close to 80% of GDP.³¹ By way of comparison, China's national debt for 2012 stood at 26.11%³² and Brazil's was at 68.02%.³³ Politicians and some economists believe that this weight of public debt in the UK is unsustainable, with long-term risks for the economy, necessitating a radical review of government funding provided for a range of services impacts on our economic competitiveness. This review resulted in a long term downward shift in levels of public spending. The result has been, and will continue to be, a change in what people can expect from public services and how those services are provided (see 2.4). Aligned with this reduction in public spending is an acceptance³⁴ that the UK economy is too heavily reliant on the financial and service sectors, and a concern that economic growth is, therefore, being restricted to London and its satellite communities.³⁵

Consumer confidence and spending declined dramatically in the years immediately after 2008 and it was this drop that partly caused government income from tax receipts to fall, placing further pressure on central government finances. Figures produced in April 2014, however, suggest that growth is now being fuelled by consumer spending and, in response, the OBR has revised their forecasts and now predict growth of between 2% and 3% each year from 2015 to 2017³⁶ with indications that the situation is improving. This is tempered slightly by the news from the 2013 Autumn Statement suggesting that growth is being driven by private consumption which 'has largely come from lower saving, not higher income'.³⁷

Making economic predictions for the long term is difficult (very few economists foresaw the 2008 crisis) but it is probable that the economies of China, Brazil and India will continue to emerge as world powers although the impact of those new markets and the increased competition on the UK economy is less clear. Foresight in economic drivers therefore has a major role in understanding impacts on the historic environment. National and local economic well-being has a profound effect on how heritage assets and landscapes are perceived and valued. For example, additional resources, both public and private, become available in a buoyant economy. These are substantial sums; a recent survey suggests that heritage tourism is worth £26.4bn to the UK economy.³⁸

2.4 Governance and civil society

There is no indication that current trends in governance and politics are likely to be reversed in the foreseeable future. These include pressure on government to reduce

³¹ http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database

³² <http://countryeconomy.com/national-debt/china>

³³ <http://countryeconomy.com/national-debt/brazil>

³⁴ <http://www.theguardian.com/politics/2011/jun/15/george-osborne-end-reliance-city>

³⁵ http://www.ons.gov.uk/ons/dcp171766_360847.pdf

³⁶ <http://budgetresponsibility.org.uk/pubs/37839-OBR-Cm-8820-accessible-web-v2.pdf>

³⁷ Office for Budget Responsibility, Economic and Fiscal Outlook. Office for Budget Responsibility 2013

³⁸ <http://www.hlf.org.uk/news/Pages/HeritageTourism2013.aspx#.UpXhaSdLN8E>

expenditure by withdrawing from traditional activities, and an emphasis on localism as an alternative form of providing services.

There is no indication that current trends in governance and politics are likely to be reversed in the foreseeable future. These include pressure on government to reduce expenditure by withdrawing from traditional activities, and an emphasis on localism as an alternative form of providing services.

All this is having a significant impact in England: major reductions in public expenditure are predicted to continue with government departments facing a budget cut of between 17.1% and 31.2% until 2018-19³⁹, the latter estimate assumes that current protection of budgets for schools, National Health Service (NHS) and aid spending remains in place. The selling-off of publicly owned assets, the increasing role of the private sector in providing services which were formerly delivered directly by central government and local authorities, and an expectation that the voluntary sector may take on some services previously provided by the state have all hit local authorities especially hard.

The future relationship between the UK and European institutions is a subject of continuing debate; so too is the future of the UK as a single nation. Both of these issues, whilst having uncertain outcomes, could have a profound impact on other drivers (such as the potential impact on immigration).

A degree of public disillusion with traditional party politics, and to an extent for the present democratic system as a whole, is well-documented.⁴⁰ This is counterbalanced by widespread popular involvement in 'single-issue' politics and movements, and by membership of organisations with environmental remits. The contribution these factors can make to national debates was witnessed when the National Trust and the Daily Telegraph, amongst others, mobilised widespread support for their campaigns against proposed planning reforms, and the successful campaign to stop the sell-off of publicly owned forests in England, both largely technologically enabled by lobbying through social media.⁴¹

Involvement of members of the public, as volunteers, in activities that were formerly the preserve of the state and professionals, is also on the increase. Retirees are especially prominent in this trend with just one in six civic volunteers being under the age of 55.⁴² The impact of changes to the retirement age, increased life expectancies, and an increase in opportunities for community engagement has yet to be felt, but is likely to vary across the country.

³⁹ http://www.ifs.org.uk/budgets/gb2014/gb2014_ch2.pdf

⁴⁰ <http://www.theguardian.com/news/datablog/2012/nov/16/uk-election-turnouts-historic>

⁴¹ <http://www.bbc.co.uk/news/science-environment-21275432>

⁴² Heritage Counts 2011 – <http://www.historicengland.org.uk/research/current-research/social-and-economic-research/heritage-counts/>

2.5 Technology and innovation

There is every sign that technological change will be a defining characteristic of the 21st century, just as it was in the 20th. Advances in technology touch every aspect of life, from the mundane to the fundamental. These advances and changes in technologies present opportunities as well as potential risks for the historic environment. Some see these technological innovations as driving towards knowledge based economies, such as research and development, software and cultural and recreational services. The UK is a major leader in knowledge services and has shared in the significant innovations in the cost, collection and distribution of information and in doing so is removing many of the current constraints, such as too much or too costly. Although there are considerable areas of long-term uncertainty over how technologies may develop and change, there is the need to ensure that innovations are in-step with manufacturing and other key elements of the national economy. Technology is expected to deliver growth: currently a 1% growth in research and development leads to a 17% increase in total factor productivity over time. The Government has identified eight great technologies that support UK science strengths and business capabilities, these are Big data, Satellites, Robotics and autonomous systems, Synthetic biology, Regenerative medicine, Agri-science, Advanced materials, and Energy storage.

Technological changes are happening at a pace previously unknown. For example in about twenty years the computer laptop has increased its capacity to process data by over a thousand fold.⁴³ In addition, innovation as well as increased computing power has led to the convergence of what were separate technologies only a short time ago. The smart phone is a prime example where telephony, internet and photographic technologies combine into a small hand held device. Some are predicting that computer artificial intelligence (AI) will overtake humans in as little as 15 years' time.⁴⁴

A major focus for technological development is the generation, transmission and storage of energy,⁴⁵ allied to low carbon technologies. Change is being driven by rising demand for energy, predicted to increase by 56% by 2040 from non OECD (Organisation for Economic Cooperation and Development) countries;⁴⁶ the need to reduce carbon based technologies, including pressures to curb green-house gas emissions;⁴⁷ new forms of demand, and risks to the security of supply. These are already driving a wide range of technological changes, such as the emergence of terrestrial and marine wind farms and solar photovoltaic panels, which have the potential to shape large tracts of the English landscape and seascape. The impact of

⁴³ http://www.planethpc.eu/index.php?option=com_content&view=article&id=66:a-brief-future-of-computing&catid=1:articles&Itemid=3

⁴⁴ <http://www.theguardian.com/technology/2014/feb/22/computers-cleverer-than-humans-15-years>

⁴⁵ <http://energy.gov/oe/technology-development/energy-storage>

⁴⁶ <http://www.eia.gov/todayinenergy/detail.cfm?id=12251>

⁴⁷ <https://www.gov.uk/government/policies/reducing-the-uk-s-greenhouse-gas-emissions-by-80-by-2050/supporting-pages/carbon-budgets>

these types of development are already being felt and are the subject of heated debates both nationally and locally, which seem certain to continue.⁴⁸

The 'digital revolution' (including mobile communications) has had a massive impact on society: on what we do, on what we expect and even on how we think. With technology still advancing, especially the reach and speed of mobile and fibre-optic communications; the full impacts (both positive and negative) of this transformation of our world are probably still to become apparent. The storage of digital data is estimated to be increasing by 60% a year,⁴⁹ bringing with it enormous challenges in archiving, but also huge potential for analysis. From 2005 to 2020, the digital universe will grow by a factor of 300, from 130 exabytes to 40,000 exabytes, or 40 trillion gigabytes (more than 5,200 gigabytes for every man, woman, and child in 2020)⁵⁰. From now until 2020, the digital universe will about double every two years. The Government's support for the provision of super-fast broadband⁵¹ points towards an understanding of the need for a sufficient and flexible technological infrastructure that competes internationally. This has the potential to change our working and living habits.

The hyper-connectivity mobile technology has enabled is changing practices and expectations, and added to the growth of the 'Internet of Things'. Opportunities for different research and research methods are being increasingly explored through a combination of gamification and crowd sourcing, for example Cancer Research UK and the Play to Cure –Genes in Space game.⁵² Such methods that previously focused on marketing have evolved into a crowd sourced research tool enabling a level of accuracy of analysis higher than currently available on most computers. It is the mass effect of engaging people in research through their connection with method rather than content that is being exploited. In combination these change means of access to information, assess views and values and tools for evaluation as well as, crucially, expectations.

The increasing availability of information through the internet is leading to developments, such as the 'Internet of Things',⁵³ where connectivity goes beyond the simple machine to machine to include objects, systems and services. This in turn leads to the development of autonomous systems which interact and communicate with their environments without human intervention.

Key amongst these future developments is the continuing merging and fusing of what were developed as separate technologies, for example the 'smartphone' combines

⁴⁸ <https://www.gov.uk/government/news/outcomes-of-the-cop19-international-climate-change-talks>

⁴⁹ <http://www.computerweekly.com/feature/Green-Storage-and-the-challenges-of-data-growth>

⁵⁰ <http://idcdocserv.com/1414>

⁵¹ <https://www.gov.uk/broadband-delivery-uk>

⁵² <http://www.cancerresearchuk.org/support-us/play-to-cure-genes-in-space>

⁵³ Ashton, Kevin (22 June 2009). "That 'Internet of Things' Thing, in the real world things matter more than ideas". RFID Journal.

mobile communications, camera, geo location and internet access into a single small device.

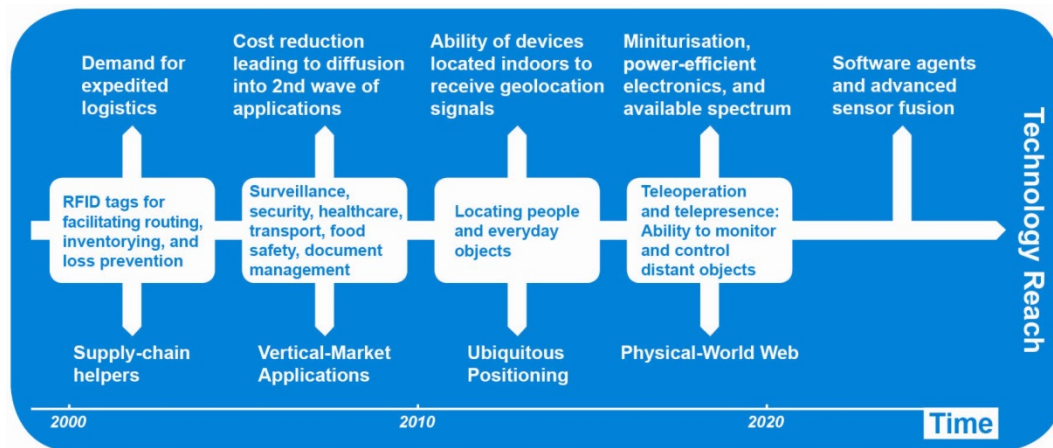


Figure 4: Technology Roadmap - The Internet of Things

Software developed initially for on-line gaming is now being used and developed in many different sectors. Within other sectors these technologies are being used to visualise what is difficult to visualise, or in some cases invisible and also to provide virtual environments where training in new skills can be learnt and where new research methods are being used increasingly taking advantage of the potential of mass response from the public engaging with gaming. Gamification is now an accepted and growing technique in the design and delivery of training. Technological development has the potential to alter social and behavioural patterns, expectations and identities.

A third area, perhaps rather less prominent in the media at present, is biotechnology. Much of this development is health-related, but an important strand is concerned with food production. With a rising global population and changing consumption patterns, demand for food, both animal and vegetable based is growing.⁵⁴

Rank	Country	Area (000,000ha)	Biotech Crops
1*	USA	57.7	Soybean, maize, cotton, canola, squash, papaya, alfalfa
2*	Argentina	19.1	Soybean, maize, cotton
3*	Brazil	15.0	Soybean, cotton
4*	Canada	7.0	Canola, maize, soybean
5*	India	6.2	Cotton
6*	China	3.8	Cotton, tomato, poplar, petunia, papaya, sweet pepper
7*	Paraguay	2.6	Soybean
8*	South Africa	1.8	Maize, soybean, cotton
9*	Uruguay	0.5	Soybean, maize
10*	Philippines	0.3	Maize

Source: Clive James, 2007.

Figure 5: Global area of biotech crops in 2007 by country (million hectares)⁵⁵

⁵⁴<http://www.foodinsight.org/Resources/Detail.aspx?topic=Fact Sheet Benefits of Food Biotechnol ogy>

⁵⁵<http://www.isaaa.org/resources/publications/briefs/37/executivesummary/default.html>

Biotechnology (including, controversially, genetically modified organisms) offers ways to increase food supply and nutritional content without necessarily increasing land take. There are developments that are aimed at providing crops which are better able to withstand changing climatic conditions. This has a direct impact on patterns of land use which, in turn, can impact on historic features and heritage assets in those landscapes.

Finally, developments in materials science and nanotechnology will fundamentally change the nature of many materials which we currently use and introduce new ones altogether⁵⁶. Nanotechnology involves the manipulation of matter at a scale that is close to the size of individual molecules. For instance the incorporation of Nano technological particles in paints and coatings can introduce properties such as anti-graffiti, anti-static, anti-mist or anti-glare, block Ultra Violet (UV) light while letting visible light through and can be used to produce self-cleaning glass.⁵⁷ Looking farther ahead the development of nano-scale filters and membranes for use in purification and disinfection will become normal for industrial and domestic water and waste water treatments.⁵⁸ This leads to smaller and more effective and efficient treatment and purification plants. Silicon is likely to remain the predominant technology used in computing for the near future. Although newly developed materials such as graphene have exceptional properties which could impact on a whole range of different technologies in the near future,⁵⁹ advances in material sciences allied to new computing technologies will see the development of quantum, photonic and biological computing into the medium term. In the meantime development of the silicon based technology will continue with increases in capacity and efficiency.

⁵⁶ <http://techportal.eere.energy.gov/>

⁵⁷ <http://www.nanoandme.org/nano-products/paints-and-coatings/>

⁵⁸ <http://www.nanowerk.com/spotlight/spotid=5914.php>

⁵⁹ <http://www.graphenea.com/pages/graphene-uses-applications#.U2oNMK1OW70>

3 Implications

As explained in section 2, this section will draw some conclusions as to the direction of the different drivers in relation to the more detailed cross cutting themes. It is an evaluation exercise carried out very simply by the ‘so what?’ test. This method forces us to draw a meaningful and crucial link between the macro drivers and what we know to be the effects they are having on the historic environment. These are laid out as bullet points at the end of each theme, each making a statement of impact, both negative and positive. We can then move on to assess those risks and opportunities over a short, medium or long term future start to consider the possible responses and mechanisms that are developed in sections 4 and 5.

3.1 Regulation and environmental land management

Regulation is vitally important in the protection of heritage in England. Assets of national importance are identified through the designation process. The Campaign for the Protection of Rural England (CPRE) estimates that protection is afforded to 51% of England’s land mass through nationally-recognised forms of heritage, landscape and wildlife designation. An additional 12.4% is covered by Green Belt.⁶⁰ While the National Planning Policy Framework (NPPF)⁶¹ places considerable emphasis on local character and distinctiveness as a means of delivering sustainable development, there are still large areas of England with relatively little or no form of designation. The marine area that is fully protected from all forms of damaging activity or extraction in the UK is much less than 1% with only three areas that amount to about 5 square kilometres completely protected including, in English waters, the seabed off Lundy Island and Flamborough Head.⁶²

In addition to statutory designations, the planning system provides a framework for the protection and management of change on all landscapes and historic features, whether designated as heritage assets or not, that together make up the historic environment. Since the formation of the Coalition Government in 2010, there has been a sustained period of review and adaption of the UK’s regulatory framework, with an undoubted impact on heritage. A new terrestrial planning framework and a reduction of the associated planning guidance has been adopted with the NPPF while marine management has been fundamentally changed through the introduction of

⁶⁰ CPRE 2012. *Protecting the wider countryside* <http://www.cpre.org.uk/resources/housing-and-planning/planning/item/2728-protecting-the-wider-countryside>. The designations comprise Sites of Special Scientific Interest, Ramsar sites (wetlands of international importance), Special Protection Areas, Special Areas of Conservation, National Nature Reserves, Local Nature Reserves, Ancient Woodland, National Parks, Areas of Outstanding Natural Beauty, Heritage Coasts, World Heritage Sites, Registered Battlefields and Scheduled Ancient Monuments.

⁶¹ <https://www.gov.uk/government/publications/national-planning-policy-framework--2>

⁶² <http://www.mcsuk.org/mpa/faqs>. Detailed spatial mapping would be required as area designations include Special Areas of Conservation, Special Protection Areas, RAMSAR sites, Marine Conservation Zones, and those SSSIs which have sub-tidal areas.

the Marine and Coastal Access Act 2009, a response to the increasing development of our marine resource.

These changes have been driven not by a need to improve levels of protection, but to deregulate and simplify systems to ensure that perceived bureaucracy does not stand as a barrier to growth. It is likely that, with the continued pressure for economic recovery for at least the medium term, these trends will continue, along with the associated risk and opportunities to heritage.

It is now nearly 70 years since the Town and Country Planning Act 1947, a period that has witnessed significant changes in society and a blurring of distinctions between urban and rural lifestyle and economies. Over the same period, other governmental incentive and regulatory regimes have had both direct and indirect impacts on heritage. The drive to boost food production, both before and since entry into the Common Market in 1973, and from the 1980s, the desire to mitigate its impact and enhance the environment through environmental stewardship and the European Habitat and Water Framework Directives have had a profound effect on the character of England's landscapes. The Common Agricultural Policy, through environmental stewardship funds, has played a major part in protecting, and improving, heritage and historic landscapes in rural areas, and has also provided support to farm business diversification and rural economies (principally through tourism, the reuse and repair of historic buildings and the multiplier effect of conservation work). Further changes to the Rural Development Programme, and future scenarios that involve the reduction or removal of subsidy, will lead to an increasing desire for a more integrated and cross- sectoral approach to designation and understanding the goods and services delivered through the sustainable management of land.⁶³

The large scale landscape designation families of National Park and Area of Outstanding Natural Beauty (AONB), with their broad protections for the historic landscape, have now been in place for some 70 years and it is becoming clear that the pressures of climate change, development and declining traditional forms of land management are bringing into question their original core purpose of landscape 'preservation'.

For reasons covered elsewhere in this section, demand for land will continue to intensify in the future. It is currently unclear whether this will lead to the development of coherent, integrated and consistent ways of understanding and valuing the historic and natural environment, or whether rural planning and land management will become more short term and ad hoc. These could then contribute to new forms of regulation and guidance designed to minimise conflict and delay in the planning system.

⁶³ Selman, P. (2009), 'Conservation designations – are they fit for purpose in the 21st century?' *Land Use Policy* 26, 142-153. English Heritage

3.2 Development

‘Development’ (broadly speaking, new construction) has very immediate and sometimes very profound impacts on the historic environment. Individual impacts occur on a short time-scale, and can involve major change to fabric, character and setting. Development is seen as important for maintaining and expanding the economy and for meeting changing social needs. Large-scale financial considerations are often involved, and it can be politically controversial. Conversely, it can also bring benefits for the historic environment, such as the renovation and re-use of redundant historic structures. Development is tightly controlled through the planning system, and this is one of major arenas where historic environment conservation has to engage with the wider drivers for change discussed in this paper.

This section focuses on three issues, all of them likely to be prominent in the years ahead: changes in overall settlement pattern and form, the provision of new housing, and the construction of infrastructure. Mineral extraction, although it is ‘development’ in planning terms (and a major topic for the historic environment) is considered under section 3.3.

3.2.1 *Settlement pattern and form*

The character of areas, regions, or indeed the whole nation, is very much a product of settlement pattern and form. Where do people live? To what extent do they live in large agglomerations (such as major towns and cities), in smaller towns and large villages, or in more dispersed forms of rural settlement?

England’s settlement patterns and forms have changed radically since the early 19th century, and are continuing to do so. Medieval patterns of settlement have provided the framework for this growth in rural areas, marked by a distinction between a central band of ‘village England’ and more scattered settlement either side. The growth of large industrial cities and towns was one of the defining characteristics of the 19th century. The renewal of such places, the rapid expansion of many former rural market towns, and changes in the character of rural settlement (including substantial increases in the size of some villages and the creation of new households as a result of smaller scale development and conversion elsewhere) characterised the late 20th century, and are continuing strongly in the 21st century. Change in the character of town centres is also a major feature of our time, as social habits relating to shopping and the way services are provided and consumed change.

These changes pose significant challenges for the historic environment. Rapid expansion (often through large-scale house-building on edge-of settlement greenfield sites) can have a major effect on the character of historic towns and villages, and on their settings. ‘Densification’ within existing settlements (including redevelopment of large urban houses and infill of plots within villages) can have the same effect. There are particular concerns about the future of town centres, with a continuing tension between the desire to retain their vitality and the convenience of out-of-town (or edge-of-town) retailing. Success in keeping retail in town centres can bring its own

problems in terms of traffic congestion and the need for parking. There has been a shift over the last 20 years in institutional retail investment away from town centres towards property 'out of town', a doubling in internet sales (from 9%) which is predicted to affect more retail businesses in the next decade, a static or falling town centre footfall, a shift in retail activity to the largest centres, low forecast levels of rental growth, a reduction in average lease length (from 25 to 7 years) and a threefold increase in vacancy levels in town centre retail stock.⁶⁴

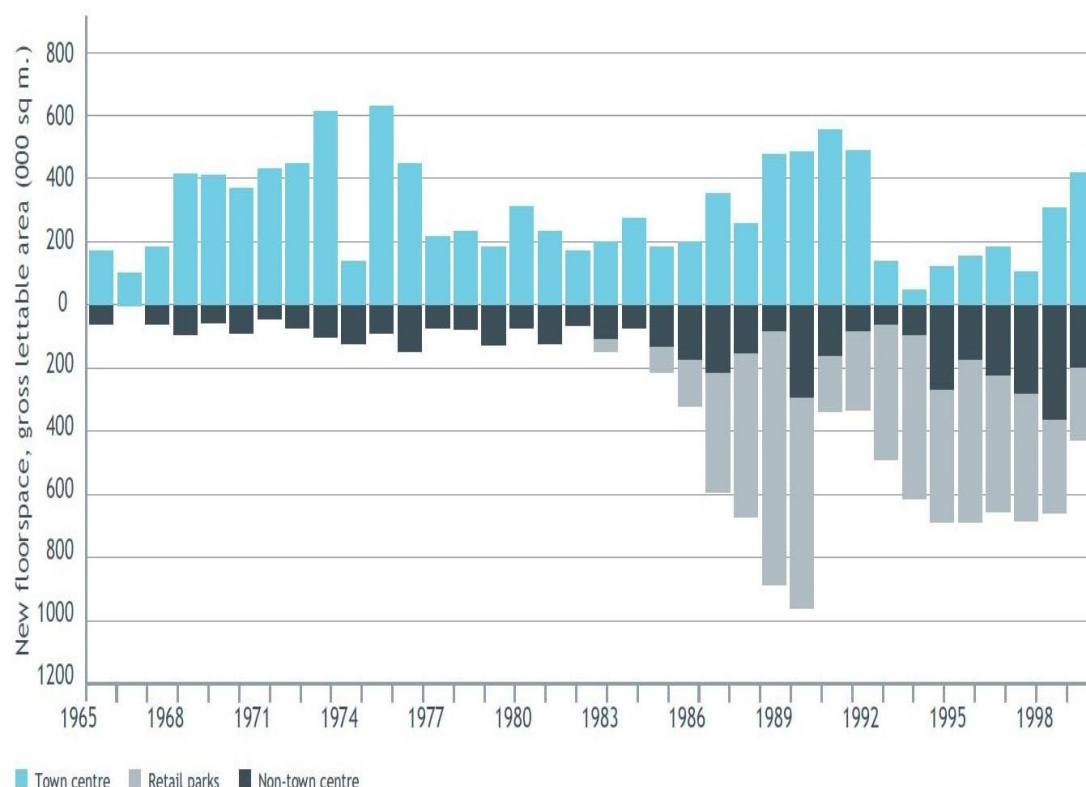


Figure 6: New forms of shopping and leisure: new retail floor space in the UK 1965 – 2000. Source reproduced courtesy of John Lord

The impact of these changes, and the opportunities open to successful models such as independent and 'click-and-collect' retailing, is subject to much local variation. Recent changes to permitted development rights may prefigure significant change in the composition of uses in town centres (along, potentially, with cumulative attrition of historic fabric through conversions which may not be under planning control). At the same time, conversion of redundant rural farm buildings to residential use can offer a way of increasing the housing stock significantly, while retaining historic character and fabric. In areas of dispersed settlement in particular, there is scope for small-scale additions to existing historic farmsteads. Already, large numbers of new households have been provided in this way, despite planning policies which

⁶⁴ Department for Communities and Local Government, 2013, *The Future of High Streets. Progress since the Portas Review*. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211536/Future_of_High_Street_-_Progress_Since_the_Portas_Review_-_revised.pdf

seemingly prevent new dwellings in the countryside. Through understanding existing character, however, such development can take place in a way that respects and retains existing patterns of dispersed settlement, and localised settlement layouts (e.g. the precise configuration of farmsteads, which varies very specifically between different areas).

3.2.2 *Housing*

In addition to the increases to the UK population mentioned earlier, an increase in the demand for housing is also being driven by the restructuring of households and living space. Work commissioned by English Heritage has shown that between 1851 and 2014 the number of dwellings increased by more than 6.5 times, whilst the population has only increased by 2.5 times.⁶⁵ Some projections envisage an increase from 21 to 31 million homes by 2060,⁶⁶ as well as the associated infrastructure, such as roads, schools and other services. Interplay between several factors is core to all scenarios: an increasing number of small households, the issue of single occupancy homes, patterns of internal migration (north to south, urban to rural), population growth within England and migration from outside the UK. Such changes work upon the varied forms of historic settlement and property of all types, as well as historic buildings.

This is further complicated by strong variations in house prices: in the viability, assembly and preparation time for development (brownfield land often being the most complex); in maximising revenue; and offsetting unexpected development and planning issues through the numbers of units per hectare. England now has the highest density of households per hectare in Europe, and 80% of its population are living in urban areas with populations exceeding 10,000 where there can be more than 30 dwellings per hectare. The rate of house building is currently at its lowest peacetime level since 1924 and the disparity between demand and supply has placed considerable pressure on government to stimulate the sector. Just over 100,000 houses were built in 2010 and it is estimated that 232,000 new houses need to be built annually in England to keep up with perceived demand. Much of the debate has focused on the potential impact of high-density housing on the fringes of urban and rural settlements, although only one in 14 new houses built between 2001 and 2011 were accommodated on the urban fringe. Since the 1990s the wider countryside, and in particular areas of dispersed rural settlement characteristic of much of rural England, has seen a greater net increase in the dwelling stock than the urban margin. The delivery of new households through the subdivision of historic property, the conversion of historic buildings and bespoke small-scale developments has and will continue to play a significant role particularly in urban cores and in rural areas with

⁶⁵ The principle source for the analysis in this and the next paragraph is the *Future of Rural Settlement* project being conducted by the University of Sheffield for English Heritage's Rural Buildings activity in the National Heritage Protection Plan (<http://historicengland.org.uk/research/research-results/activities/>).

⁶⁶ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/288843/10-631-land-use-futures.pdf

the most restrictive planning policies. Conversion has augmented the dwelling stock by as much as 40% in some areas (see also section 3.3.1, Agriculture).

Land use data ⁶⁷	Proportion of England land	
Use	2013	Future scenarios place agricultural land under particular pressure as increases are envisaged for all other land uses
Agricultural land, including enclosed land and rough ground	72%	
Forestry and woodland	8.6%	
Water	2.6%	
Developed land, including domestic gardens (4.5%); and buildings (1.1%)	7.5%	
Communications (road, rail and air infrastructure)	2.4%	
Other green space	6.9%	

Figure 7: Land use data in England 2013 (NB number may not total 100% due to rounding)

So what?

- Increased pressure for housing and other development on green infrastructure and associated historic features, within and on the fringes of settlements
- Increasing demand, now facilitated by Government's desire to relax Permitted Development Rights, for conversion of redundant and vacant buildings - commercial and industrial buildings in urban areas, including High Street properties and farm buildings in rural areas
- The broader countryside beyond the urban fringe has accommodated far more newly-built dwellings and seen a greater net increase in the dwelling stock than has the urban fringe, raising the importance of using an understanding of local character to inform development and high-quality design in all areas
- Increased pressure for development in high-demand and economically buoyant areas, particularly in the south-east and other favoured urban areas, countered by the need to retain vulnerable profit margins where the market is weak
- An increasing demand for more labour and energy-efficient building techniques, such as off-site manufacture and timber-frame construction, in combination with the recognition for new forms and styles of development to be integrated with historic places

3.2.3 Infrastructure

Improvements to road, rail and air transport infrastructure, which occupies 2.4% of the land area, are vital for the UK economy. A total of 191 road projects are planned, and although a decision is awaited about the site of the new airport for London there are strong economic claims to expand and improve the existing networks of airports.

The Airports Commission: interim report, published in December 2013, looked at possible opportunities for the expansion of the existing airport infrastructure and concluded that the best options involved further development of runway capacity at Heathrow and/or Gatwick. No decisions (at time of writing) have been taken, and a

⁶⁷ Generalised Land Use Database (CLG 2013)

<http://data.gov.uk/dataset/land-use-statistics-generalised-land-use-database>

final report, outlining agreed recommendations, will be produced by the summer of 2015. Likewise, the future of the High Speed 2 railway (HS2) has recently been debated, but the current government estimates (April 2014) are that the economic benefits would amount to £15bn. Although a final decision about expansion at either Heathrow or Gatwick is awaited, similar plans are underway at other regional hubs (see fig.8). The arguments relating to the siting and extent of the increased and upgraded infrastructure are closely linked to other issues, such as the provision of new housing, business connectivity and commercial development.



Figure 8: Luton Airport - there are plans to double its capacity to 18 million passengers per year.

With a significant proportion of the UK's energy generation capacity reaching the end of its useful life, there is a need for the UK to undertake the construction of additional power stations, improvements to energy transmission systems and the continued growth of alternative energy sources. Energy developments and to a lesser extent transport account for over three quarters of all the planned spend in the National Infrastructure Plan (December 2014).⁶⁸

So what?

- Decisions about infrastructural improvements are contentious. They are 'challenging' on a number of levels:
 - Substantial government funding is required
 - There is often over-riding local opposition to proposed development due to impact on quality of life issues such as landscape value and a concern about negative impacts on property values

⁶⁸ <https://www.gov.uk/government/collections/national-infrastructure-plan>

- The strategic choices draw together a number of threads: social, economic, and environmental
- Proper consideration is essential: the decisions made will have a profound impact on the physical and social fabric of our lives
- Depending on the scale and scope of the various infrastructure initiatives, it may well be that, as a sector, our ability to respond is jeopardised by a lack of resources

3.3 Landscape and resource exploitation

3.3.1 Agriculture

The last 70 years has witnessed an acceleration in historic trends in farming, principally an increase in the average farm size accompanied by a reduced number of working farms (down by around half) which continues to have a knock-on effect on the structure of rural communities; an increase in hobby farms, often in peri-urban areas; the diversification of the average farm (58% of farms derive income from non-farming sources); and the increasingly widespread use of inorganic fertilisers.⁶⁹ The result has been a well-publicised loss of historic parkland, water meadows, orchards, wetlands and field boundaries and trees.

There is a wide range of technologies under development which offer different threats and opportunities for the historic environment: the intensification and expansion of arable farming; the potential for precision farming using Global Positioning Systems (GPS) and Geographical Information Systems (GIS) mapping to minimise impact on sensitive areas and sites, the development of on-farm infrastructure with anaerobic digestion systems, solar and other forms of renewable energy; and continuing concern.⁷⁰ Risk modelling, a notable example being the *COSMIC (Conservation of Scheduled Monuments in Cultivation)* project,⁷¹ demonstrates that there is a wide range of variables (geology, topography, rainfall and soils) that need to be taken into account, all of which have been affected by the interaction of human and natural factors over millennia.

Farmland has gained a strong reputation as a safe investment for domestic and foreign buyers, and the farming industry is continually responding to local and global markets. Savills (the estate agent) have forecast growth of 40% in farmland values over the next five years with expansion of farm enterprises cited as the main driver

⁶⁹ Summarised in A. Angus et al, 'Agriculture and land use: Demand for and supply of agricultural commodities, characteristics of the farming and food industries, and implications for land use in the UK', *Land Use Policy* 26, 230-242; *The Future of UK Land Use and Management* (Defra 2010) <http://sd.defra.gov.uk/2010/03/future-uk-land-use-management/>.

⁷⁰ For further information on farming futures see: <http://www.farmingfutures.org.uk/>. For Defra statistics and overview of state of British agriculture <https://www.gov.uk/government/organisations/department-for-environment-food-rural-affairs/about/statistics>

⁷¹ Conducted by Oxford Archaeology for English Heritage and being updated: <http://oxfordarchaeology.com/research-projects-by-name/245-cosmic-conservation-of-scheduled-monuments-in-cultivation>

and noting an increased gap between the most prized commercial arable land and the least valuable grazing land, concentrated in upland areas, where farming businesses are less viable and most dependant on diversification.⁷² Strong local variations in the functional redundancy, conversion and dereliction of traditional farm buildings have been identified by English Heritage, but the mapping of all surviving traditional farmsteads in some areas has also revealed that up to two thirds are no longer in agricultural use. The highest rates of survival in agricultural use are concentrated in upland and upland fringe areas, and elsewhere tend to be associated with the largest-scale farmstead types. In the West Midlands the proportion of historic farm properties with home-based limited liability companies is more than three times higher than in other dwellings regardless of where they are located. Also, relative to households, they are concentrated in desirable rural locations with high property values that are close to major population centres of high economic mass.⁷³ Agri-environment schemes have played a key role in delivering the maintenance and conservation repair of traditional buildings throughout England. They have been particularly critical in those upland areas where farm incomes are lowest and buildings are most sensitive to conversion, and studies in National Parks have shown how the repair of traditional buildings has contributed to local economies.⁷⁴

Local variations in landscape character and type, which have been captured through county-based Historic Landscape Characterisation (HLC) and Natural England's (NE) revision of the National Character Areas (NCAs), provide the framework for considering responses to different forms and intensity of land use.⁷⁵ These range from arable farming which continues to pose a significant threat to archaeological sites of national and local importance to the threat at posed by bracken rhizomes due to the decline in managed grazing in upland areas.⁷⁶ These merit analysis in a national

⁷² http://www.savills.co.uk/research_articles/141557/144127-0

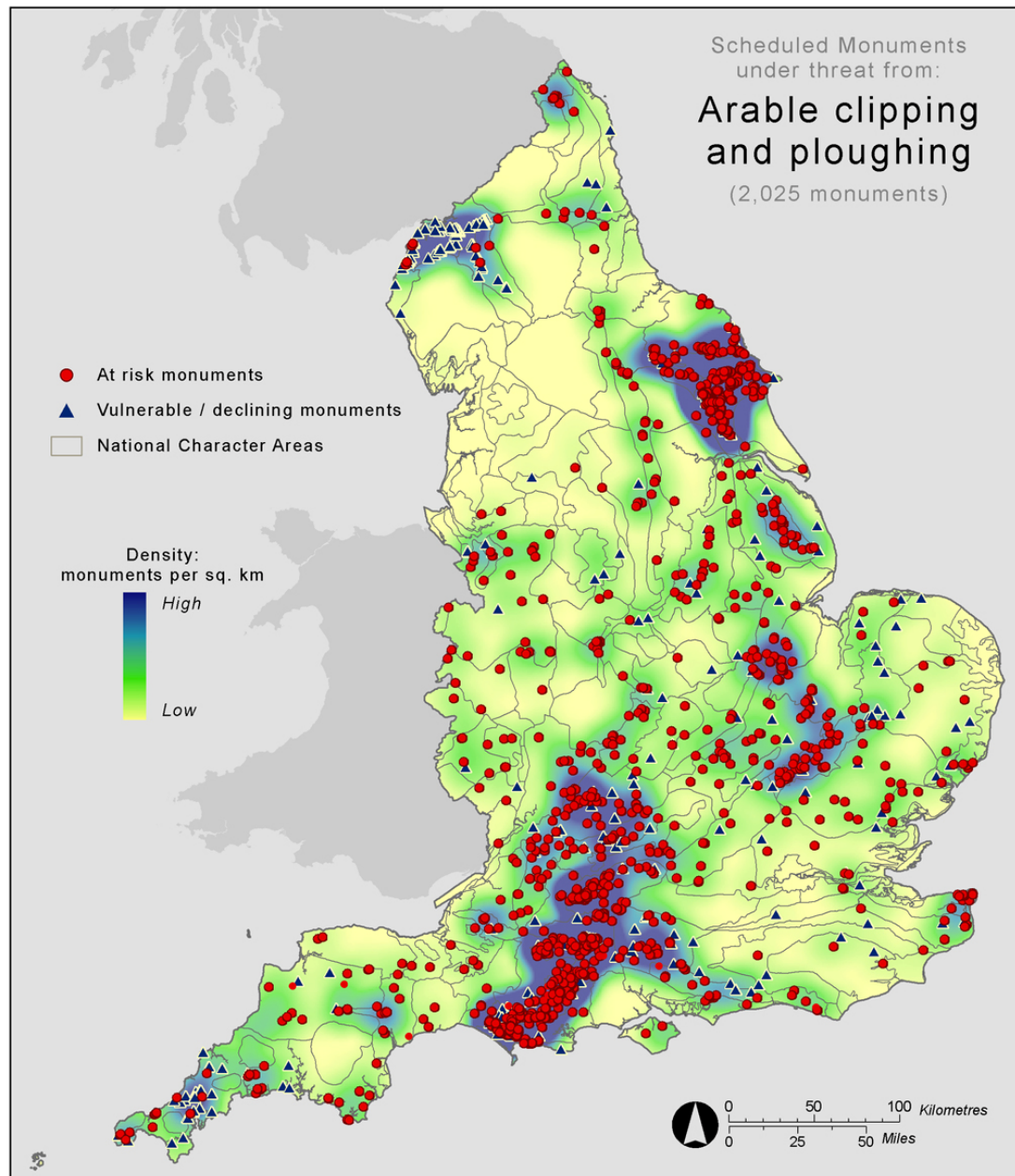
⁷³ Gaskell, P and Owen, S 2005. *Historic Farm Buildings: Constructing the Evidence Base* (English Heritage/Countryside Agency/University of Gloucester); English Heritage 2009. *Historic Farm Buildings: Extending the Evidence Base*. For *The West Midlands Farmsteads and Landscapes Project: Summary Report*, see <http://content.historicengland.org.uk/images-books/publications/west-midlands-farmsteads-landscapes/west-mids-summary.pdf/>

⁷⁴ For capital schemes in the Lake District and Yorkshire Dales National Parks see ADAS (2005) *A study of the social and economic impacts and benefits of traditional form building repair and re-use in the Lake District ESA*; English Heritage and Defra. Also CCRU and ADAS (2007) *A study of the social and economic impacts and benefits of traditional farm building and drystone wall repairs in the Yorkshire Dales National Park*. The same methodology was used to estimate the economic value of traditional building restoration projects within all the National Parks – *National Park Authorities – assessment of benefits* (Defra 2011) at https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69310/pb13533-national-park-authorities.pdf

⁷⁵ For the updated National Character Area profiles see <http://www.naturalengland.org.uk/publications/nca/default.aspx#profiles>. Historic England is also developing *Farmstead and Landscape Statements* which summarise the development, issues for change and key historic characteristics including farmsteads for each of these areas.

⁷⁶ First comprehensive report on this in English Heritage 2005, *Heritage Counts—the state of England's Historic Environment*.; for the results of updating a 1999 survey of Midlands ridge and furrow see Gloucestershire County Council for English Heritage 2012, *Turning the Plough Update Assessment*. For bracken see <http://www.brackencontrol.co.uk/> (Bracken Control Group)

context, so that we can gain a more comprehensive understanding of future patterns of threat in relationship to changing patterns of land management. A high proportion of scheduled ancient monuments, for example, are located within National Character Areas that have experienced a recent decline in the numbers of farms and agricultural workers in tandem with an increase in managed farms as shown in Figure 9.



© Crown Copyright and database right 2013. All rights reserved. Ordnance Survey Licence number 100024900

Figure 9: This map shows scheduled ancient monuments known be at risk from plough damage (11.5% of those at risk) and those in declining condition.

The National Mapping Programme (NMP) is continually revealing the location and extent of archaeological features such as ridge and furrow, in addition to pre-medieval settlement and land use revealed through arable cultivation especially in

areas of free-draining soils.⁷⁷ Few of these activities are subject to statutory or other controls, but sustainable land management and funding through the Rural Development Programme (RDP) has played a critical contribution to the conservation of the historic environment and landscapes. Historic characterisation, and the identification on Historic Environment Records (HERs) of heritage features, including as a result of the NMP and through the SHINE database (Selected Heritage Inventory for Natural England),⁷⁸ has informed delivery of these schemes and planning for any post-2015 schemes.

Evident from the map of protected ancient monuments vulnerable to plough damage (see Figure 9 below) are the high risks that such practices bring to heritage features in the landscape, particularly in areas subject to more intense arable cropping and continuing loss of permanent and rough grassland. Natural England's analysis of trend data for the NCAs shows a clear shift to agricultural contractors in the Chalk and Limestone landscapes with (as recently noted in Dorset Downs and Cranborne Chase) a decline in agricultural workers and increase in farm managers. The NCAs classified as Eastern Arable, where arable agriculture has intensified over the last 200 years, have also sustained the development of increasingly large-scale arable enterprises, but also evident from the map are other areas where high numbers of medium-risk monuments are in declining condition. Particularly clear in the north-west are the Solway Basin and Eden Valley, where there has been a 30 per cent increase in arable farming since 2000.

So what?

These changes, and those which are in response to other drivers, will result in a number of specific impacts, in tandem with government's desire to reduce the regulatory burden on farmers.

- The long-term risks to archaeological sites and palaeoenvironments include the intensification of arable farming on the most productive land and its extension into some areas of long-term pasture; the greater use of deep-rooted energy crops and pressure for 'rewilding' and climate change mitigation especially on less productive land
- Many of the most cherished historic features of protected landscapes (such as the Yorkshire Dales or the Cotswolds) have been functionally redundant and unmaintained for generations and now rely on public subsidy for their continued survival: a model that will be increasingly difficult to sustain
- Increased need for on-farm infrastructure, such as reservoirs, plant for anaerobic digestion systems, wind energy, solar power (especially on modern sheds) and livestock housing
- The loss of traditional farm skills, such as walling and building repair
- The functional redundancy of traditional farm buildings and farmstead sites, which has led to a lack of maintenance and, in some instances, dereliction

⁷⁷ <http://historicengland.org.uk/research/research-results/recent-research-results/>

⁷⁸ See <http://www.myshinedata.org.uk/>

especially in upland areas: this is counterbalanced by opportunities for reuse and development informed by their significance and sensitivity to change

3.3.2 Woodland and forestry

Woods and trees, including those in historic boundaries and in distinctive landscapes such as wood pasture and parkland, are heritage features in their own right. There is also a rich diversity of historic features resulting from their past exploitation within woodland, such as temporary settlements, stock boundaries and charcoal platforms, in addition to features which may survive from earlier phases of agriculture and settlement. New remote sensing techniques such as LIDAR (Light Detection and Ranging⁷⁹) and the geo-referencing of historic maps are increasing our understanding of these features but the evidence base remains relatively poor to date. The area occupied by woodland and forests (8.6%) has more than doubled in the last 100 years. This has largely been down to coniferous planting on poorer soils and the planting of broadleaf woodland on farmland in response to subsidies from the 1980s. Despite this, the area of woodland cover in England remains comparatively low, with the EU average standing at 37%, and the UK being one of the largest importers of timber products globally.⁸⁰ Initiatives to realise the social, economic and environmental benefits of woodland are already utilising the *National Ecosystem Assessment* and highlighting the need to integrate this with identification of historic character and heritage features.⁸¹ The Forestry Commission has developed harvesting techniques that are sensitive to the historic environment and heritage features, and has commissioned much research on future change and its impact.⁸²

So what?

- Climate change poses significant risks: resulting in an increasing frequency of strong winds, intense downpours and heatwaves, there is an increased likelihood of fire and wind damage and through its impact on drought-sensitive trees (particularly in southern and eastern England)
- Non-native species and changes to silviculture to strengthen resilience against disease, and increased incidence of disease affecting native species, will change the appearance of historic woodland and the setting to heritage features
- Renewed intensification of production for timber products and woodfuel in historic woodland, including short rotation coppicing
- There is relatively little understanding of the many factors, from root depth to the chemical and moisture content of soils, which will affect the preservation of archaeological deposits and the rate of change due to heavy rainfall and other climatic factors
- Some significant themes have fallen between historic and natural environment protection measures and continue to be vulnerable. Traditional orchards have been in steep decline but have been the subject of very little research.

⁷⁹ <http://en.wikipedia.org/wiki/Lidar>

⁸⁰ Defra 2009, 4.4; for Forestry Commission research see <http://forestry.gov.uk>

⁸¹ For *National Ecosystem Assessment* see <http://uknea.unep-wcmc.org/>

⁸² <http://www.forestry.gov.uk/website/forestresearch.nsf/ByUnique/INFD-837EZY>

- Similarly wood pasture, although a UK Priority Habitat, is not mapped and there is also little protection offered to veteran trees. The commitment by government to an expansion of woodland cover to 12% of England's landmass by 2060 and to greater community involvement alongside improved public access to woodland will affect all areas but with a stress on upland, upland fringe and urban fringe areas. This is counterbalanced by the threats to ancient woodland from development including transport infrastructure

3.3.3 Minerals

Minerals are a finite natural resource and as they can only be worked where they are found, it is important to make best use of them to secure their long-term conservation. England is one of the most geologically diverse countries in the world, and the extraction industry is actively seeking to make the best use of indigenous resources, including their safeguarding from other development, in order to help reduce supply from other and less regulated global markets. The minerals industry has made a fundamental contribution to the historic character and significance of England's landscapes and settlements, and there has recently been archaeological investigation into how minerals extraction has developed from the Neolithic period.⁸³ These include some of our finest designated landscapes such as the Peak District National Park and Cornwall and West Devon Mining Landscapes World Heritage Site. Sand and gravel workings have considerable archaeological potential due to the relatively intense use of river valleys and terraces in the prehistoric and later periods.

There are many facets to the industry which have been subject to Foresight studies.⁸⁴ These include industrial minerals such as salt and kaolin and energy minerals including potential new reserves such as tungsten tin in west Devon, the most significant in terms of their impact on the historic environment being:

- Construction minerals, the production of which has sharply declined in step with the economic downturn; the quarrying of rock and slate, of aggregates as sand, gravel and crushed rock, brick clay and the raw materials for cement, where the industry has greatly reduced CO₂ emissions in the manufacturing process
- Energy minerals – oil and natural gas, the latter increasingly reliant on imports via pipelines and Liquefied Natural Gas (LNG) shipments. Coal is in continuing decline with surface mining accounting for an increasing share. The UK has moved from a major exporter to a major importer of energy minerals and metals. With the closure of power stations and persistent uncertainty about its energy strategy it is set to become 'a high energy cost nation' with attendant concerns with regard to energy security and carbon emissions.⁸⁵ Carbon capture and storage technologies are considered to be key to stimulating UK production in tandem with the

⁸³ For a summary of work funded through the Aggregates Levy Sustainability Fund (2002-11) see publications.naturalengland.org.uk/file/92017

⁸⁴ UK Minerals Forum Working Group (2013) *Future Mineral Scenarios for the UK* at www.bgs.ac.uk/ukmf/home.html; see also Bloodworth, A.J. et al (2009), 'Digging the backyard: Mining and quarrying in the UK and their impact on future land use', *Land Use Policy* 26, 317-325.

⁸⁵ National Grid 2013. *UK Energy Scenarios Report*. Report and related documents available from <http://www.nationalgrid.com>

continuing development of renewable technologies and exploring the potential of previously inaccessible reserves through hydraulic fracturing (fracking).

Demand and supply will all be affected by the key drivers outlined in section 2, key variables being the proximity and disturbance to local communities and heritage assets;⁸⁶ the supply of indigenous and imported minerals; changes in land values which may make other uses more profitable than minerals extraction, and the climate change agenda. This agenda is demanding increasingly innovative methods for extraction, processing and transport of minerals, while placing increased demand on UK minerals, especially aggregates for the construction of coastal and river flood defences. However the use of recycled and secondary material has contributed over 25% to aggregates supply, and a significant role will also be played by new extraction, processing and environmental technologies, such as deep-sea mining, underground aggregates extraction and ‘superquarries’.⁸⁷

So what?

- It is critical to guarantee the supply of indigenous stone and slate, often from designated landscapes and sites, for historic buildings and locally distinctive new development. The closure or unavailability of quarries poses a significant threat to the historic environment.⁸⁸ Imports of roofing slate from India, China and Brazil already exceeds domestic production, and some historic sources (e.g. Collyweston slate) are no longer available
- Maintenance of built fabric is therefore critical to the conservation of the whole resource, much of which (especially in stone-building areas) is not designated
- Loss of local distinctiveness and heritage assets through the loss of traditional skills needed to maintain this.
- It is important to work with the industry in order to retain a proportionate approach to developer-funded investigation, and thus retain the considerable benefits that have been delivered to the understanding and protection of the historic environment. This and a consistent evidence base is fundamental to the consistency of approach and integration of natural and historic environmental issues which the minerals industry⁸⁹ and Mineral Planning Authorities require for

⁸⁶ For a summary and analysis see Blades, N., Marchant, G. and Greening, G. 2006: *Impact of Aggregates Extraction and Transportation on the Historic Environment*. Final unpublished project report submitted to English Heritage

⁸⁷ Ove Arup 2013. *Aggregate Industry Horizon Scan*.

<http://www.sustainableaggregates.com/strategic/project1.htm>; see also Boston Consulting Group. 2012 *Aggregates Sector Strategy Review*, which aims to integrate the environmental and business case for change, at http://www.sustainableaggregates.com/library/docs/l0007_ctc754.pdf

⁸⁸ Strategic Stones Study Database at

www.bgs.ac.uk/.../buildingStones/StrategicStoneStudy/EH_project.html. Many factors such as bed thickness and grain affecting suitability for quarrying and longevity once bedded – the latter of course in combination with mortar mix and finish. See also British Geographical Society Factsheet, *Building and roofing stone*, 2009 <http://www.bgs.ac.uk/mineralsuk/buildingStones/publications.html>

⁸⁹ The need for some streamlining of regulation has been identified by the Minerals Products Organisation in its 2013 report: *The Cumulative Impact of Environmental and Planning related Taxation*

future planning including up-to-date Minerals Plans, Local Geodiversity Action Plans and Environmental Impact Assessments, so that the sensitivities of sites and their settings to extraction and associated transportation, working areas and waste tips can be identified and where necessary mitigated through re-siting, landscaping and archaeological conditions

- New developments in the aggregates industry demand continued refinement of our understanding of the extent of the aggregates resource and the respective impacts and archaeological potential of marine, floodplain and terrace aggregates extraction
- The potential exploitation of unconventional hydrocarbons (e.g. natural gas through fracking) will require a strategic approach to the assessment of the impact of short-term drill platforms for exploration and production and their mitigation during their working lives and after production has ceased

3.4 The environment

Section 2 proposed that climate change should be seen as a risk multiplier within a context which recognises that changes are already happening within the environment as a consequence of shifting long-term atmospheric behaviour. The latest assessment figures⁹⁰ suggest that the following trends exist:

- temperature is rising - globally averaged land and ocean surface temperature show a warming of 0.85°C from 1880 to 2012
- sea-level is rising - the rate of sea level rise since the mid-19th century has been larger than the mean rate during the previous two millennia, rising by 0.19m from 1901 to 2010

The major direct impacts of climate change on the wider environment will include flooding; coastal change due to sea-level rise and coastal erosion; temperature rise; increase in the frequency of more extreme weather events (i.e. heavy rainfall and drought) leading to less reliable water availability; and changes in the distribution of species. These changing conditions will affect the historic environment, both directly through the action of attendant physical, biological and chemical processes, and indirectly through the actions undertaken to adapt to or mitigate them. The effects will be felt by all types of heritage asset, whether on land and or in sea, comprising buildings, buried archaeology, parks and gardens and landscapes.⁹¹ The scale of impact will be highly variable, with little or no adaption required for some assets, through to the possible acceptance of unavoidable loss for others.

& Regulation. A preliminary and indicative assessment from the Mineral Products sector.
www.mineralproducts.org

⁹⁰ Intergovernmental Panel on Climate Change (IPCC) 2013. *Summary for Policy Makers (SPM). Climate Change 2013: The Physical Science Basis*. Twelfth Session of IPCC Working Group I, Stockholm, Sweden. September 27, 2013.

⁹¹ Croft, A (2013) *Assessment of Heritage at Risk from Environmental Threat: Key Messages Report*. Unpublished report for English Heritage Birmingham: Atkins Heritage

3.4.1 Flooding

Increased flooding is the greatest domestic risk from climate change⁹² with between 1.7 and 3.6 million people expected to be at risk of recurrence by 2050. Climate change is already thought to have doubled the risk of the severe floods which occurred in autumn 2000 across England and Wales, damaging 10,000 properties and causing an estimated £1.3 billion in insurance losses.⁹³ Severe winter flood events have continued to occur since that time culminating in the persistent floods of winter 2013/14 and the wettest January since 1766.



Figure 10: Aldbrough is located approximately 10 km south-east of Hornsea (East Riding of Yorkshire). The cliffs here are rapidly eroding so that Seaside Road now terminates at the cliff edge

3.4.2 Coastal change

Currently, 28% of England and Wales coastline is experiencing erosion greater than 10cm per annum.⁹⁴ As coastal responses to climate change are strongly influenced by local conditions they are hard to predict with confidence, although it is likely that rates will increase in actively eroding stretches of coastline. Sea-level rise will also

⁹² Defra (2012) UK Climate Change Risk Assessment: Government Report. January 2012.

⁹³ Pall, P, Aina, T, Stone, D A, Stott, P, Nozawa, T, Hilberts, A G J, Lohmann, D & Allen, M R (2011) Anthropogenic greenhouse gas contribution to flood risk in England and Wales in autumn 2000 *Nature* 470:382-385.

⁹⁴ Russell, P and Maselink, G (2013) Impacts of climate change on coastal erosion. Marine Climate Change Impacts Partnership: Science Review 2013. Published online 28th November 2013

affect low-lying areas, principally those beneath the 1m contour in the short to medium term, with severe impact likely by 2080.⁹⁵

3.4.3 *Temperature change*

There is an overall trend for increasing global average temperature since the late 19th century; temperatures have risen by just below 1°C. Though this might not sound very much, it is worth considering that a global average temperature rise of 2°C above pre-industrial levels (a not unrealistic rise given current circumstances) has not existed for over 100,000 years. In the short to medium term, change in mean temperature will predominantly affect sea-level with consequences for coastal inundation. It will also influence habitat availability for a wide range of species, altering their distribution patterns and forcing migration for many and allowing exotics to expand into new areas.

3.4.4 *Water availability*

Predicted changes in seasonal rainfall patterns suggest that whilst heavy winter rainfall may become more frequent, so too might drier summers. Significant regional variation is likely, but overall the following might be expected:⁹⁶

- lower groundwater in late summer/autumn
- overall reduction in recharge of groundwater in southern England (not just seasonal)
- increased saline intrusion into coastal aquifers

Increased competition for water is also likely and water security, i.e. ensuring an adequate and safe public supply, is a key challenge in the mid-term. It may change permitted uses and consequences for irrigating parks and gardens are likely to occur.

3.4.5 *Biogeography: distribution of animals, plants and pathogens*

The impacts of climate change could be significant for a range of species and habitats by 2050,⁹⁷ and include opportunities, such as the ability for some species to expand their habitat range. Alternatively, species that are currently at the threshold of their tolerance for environmental conditions may be lost, changing elements of native woodland, designed and other historic landscapes. Invasive non-native species, pests and diseases may become increasingly common, leading to large-scale change of landscape character as well as introducing new threats to historic buildings and collections. Trees and timber appear to be particularly vulnerable with new threats apparently accelerating over the past decade. Until recently, the spread of many exotics has been limited by the fact that environmental conditions are unsuitable for successful breeding; any shift in climate will alter this, albeit on a species-specific basis.⁹⁸

⁹⁵ Zsomboky, M, Fernandez-Bilbao, A, Smith, D, Knight, J and Allan, J (2011) *Impacts of climate change on disadvantaged UK coastal communities*. Joseph Rowntree Foundation.

⁹⁶ Acreman, M, Blake J R, Booker D J, Harding R J, Reynard, N, Moutford, J O and C J Stratford (2009) *A simple framework for evaluating regional wetland ecohydrological response to climate change with case studies from Great Britain*. *Ecohydrology*, 2: 1-17

⁹⁷ Defra (2012) UK Climate Change Risk Assessment: Government Report. January 2012.

⁹⁸ Tree pests and diseases www.forestry.gov.uk/forestry/infd-6abl5v. Accessed 06.02.14

3.4.6 *Indirect impacts*

Actions designed to adapt and mitigate the effects of climate change are also having an effect on the fabric and/or setting of heritage assets. These actions, influenced by people's attitudes and values include the addition of renewable energy sources; the enhancement of flood resistance measures; the management of coastal retreat; proactive changes in environmental stewardship; and changes to buildings to improve comfort, safety and/or running costs. Investment and commitment to implement these measures is highly variable and, as indicated earlier, at a national level is influenced by other factors, predominantly economics. It is therefore hard to predict how significant low-carbon solutions and environmental adaptation will be in mitigating climate change risk. Even in the short-term (2020), UK targets for both mitigation and adaptation strategies appear to be overly ambitious.

So what?

- Flood water inundation and saturation will damage historic buildings and designed landscapes, particularly if standing water conditions develop
- Sudden heavy rainfall as well as the cumulative impact from less intense, but repeated, events can be equally damaging
- All types of asset may be affected by the erosive power of high energy flood water (e.g. buried archaeology in floodplains) and physical damage from entrained objects (e.g. bridges)
- Assets on the coastal fringe will become increasingly at risk from inundation, damage or loss from erosion, with foreshore and cliff-top equally vulnerable, depending on geology
- Dunes, peats and other inter-tidal deposits are likely to come under greater threat if wave energy and storminess increase
- Accelerated erosion will also yield opportunities to improve archaeological understanding, e.g. exposure of deposits between Pakefield and Happisburgh, East Anglia by coastal erosion, have led to investigations that have revised our understanding of the earliest prehistory of Britain
- Changes in temperature and water availability will alter the appearance of some historic and designed landscapes through vegetation change
- Hotter, drier conditions may also increase the risk of fire, particularly for upland landscapes
- The distribution and impact of insect and fungal infestations may increase, affecting historic buildings and organic artefacts
- Greater extremes and fluctuations of temperature (heat as well as cold) will increase thermal expansion and contraction of materials – wood, stone, metal, paint – causing accelerated attritional damage
- Freeze-thaw erosion of stone that occurs as a consequence of frost action in severe cold weather⁹⁹ may diminish if winters become milder
- In drier conditions, the risk of soil erosion increases

⁹⁹ *Extreme weather warning: Britain's heritage buildings feel the heat – and cold.* The Independent, 17th March 2012

- In dry conditions soil shrinkage, particularly of those that are clay-rich, can lead to building subsidence, structural deformation and collapse in the most severe cases¹⁰⁰
- Desiccation of soils and lowered groundwater levels will also increase the risk of decay to waterlogged archaeological and palaeoenvironmental remains
- Opportunistic exotic species may thrive, changing landscape characteristics creating new risks for historic buildings and collections
- For some assets, in some places, mitigating the impact of climate change in the medium to long term might not be practical, or even possible. In such cases there will need to be a clear rationale for accepting loss.
- The historic environment will also be affected by actions undertaken by other sectors to adapt to, mitigate for or counter predicted environmental change

3.5 The marine environment

Apart from being the conduit for 95% of all imports and exports,¹⁰¹ the UK sea area is three times larger than its landmass, with about 20,000km of coastline, and it has a substantial recreational and heritage value. Heritage assets in the sea relate to all periods of history since the rise in sea level following the melting of the glaciers in the last ice ages. Subsequent evidence of seafaring relates to the development of England as part of a maritime nation – war, trade, colonisation, leisure and recreation, sea defence, communication technology, immigration and emigration.

As a result there is a historic commonality of value and benefit; however, it may be that due to many factors, including globalism and changes in individual perceptions, this resonance with maritime heritage appears to be becoming increasingly less important.

Being permanently submerged also means the physical evidence of our past that survives in the sea is hidden and inaccessible to most of the population. In one sense this has meant that what does survive is often in better condition, having been protected from the damage and destruction that the terrestrial historic environment has been subjected to through traditional development, settlement and population growth. The seabed is also a relatively good burial environment, sheltered from the main agents of change, meaning that in general preservation is better than on land. More elements of a site (particularly organic materials) survive better, so more of the evidence is present, therefore there is a great potential for using the marine historic environment sustainably to the benefit of all.

At the same time the development resource potential of our marine area is being increasingly realised and exploited with the resultant threats to the surviving heritage.

¹⁰⁰ Ibid

¹⁰¹ HM Treasury, 2013, National Infrastructure Plan. HM Treasury, London, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263159/national_infrastructure_plan_2013.pdf

In particular:

- Electricity generated by offshore wind doubled between 2010 and 2012¹⁰²
- Around 20% of sand and gravel used in the UK comes from marine sources¹⁰³ with a 20% growth in production in 2011¹⁰⁴
- Oil and gas make the highest annual contribution to the economy of any activity in the marine environment with a gross value added of £37billion in 2008, up from £29billion in 2007, and fishing and related industries continue to supply food nationally and abroad and supports a variety of communities¹⁰⁵

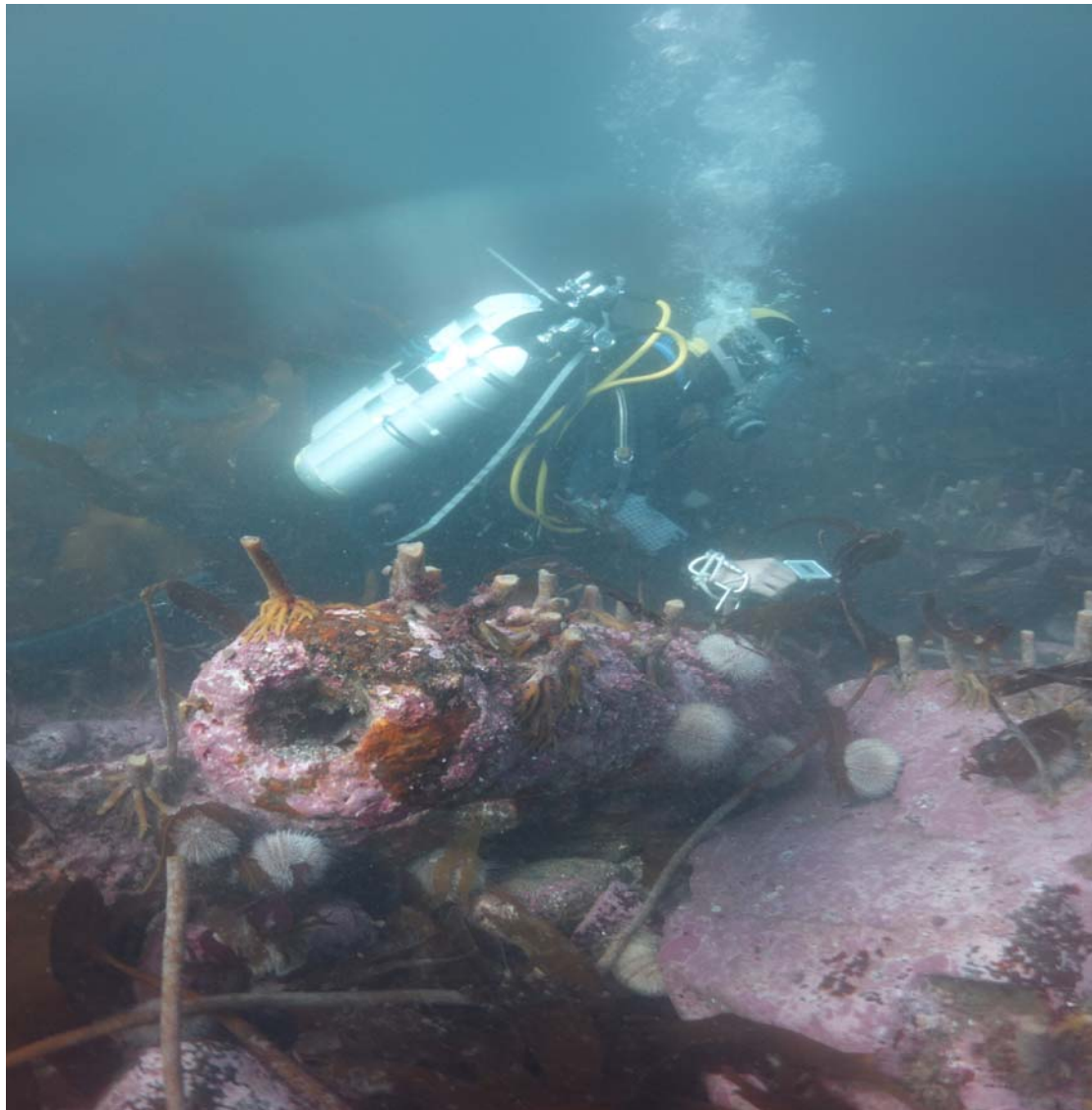


Figure 11: Historic shipwreck management accommodating environmental change: English Heritage monitoring of iron guns on the Gun Rock site (copyright Historic England)

¹⁰² https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226121/offshore-wind-infographic.pdf

¹⁰³ 15 – 20 million tonnes of sand and gravel is annually dredged from Crown Estate licences in England and Wales <http://www.thecrownestate.co.uk/media/414577/ei-2013-marine-minerals.pdf>

¹⁰⁴ http://www.bmapa.org/documents/BMAPA_SD_Report2012.pdf

¹⁰⁵ http://chartingprogress.defra.gov.uk/feeder/Section_3.9_Oil_and_Gas.pdf

Despite the advent of a measure of protection of the marine historic environment from the planning system after the passing of the Marine and Coastal Access Act in 2009, the heritage conservation benefits are not comprehensive compared to those delivered to terrestrial assets by land planning. Planning and environmental management in the marine zone is unequivocally directed at the needs of conservation of the natural environment. Recognition of, and reference to, the marine historic environment in marine environmental management structures is low, and mechanisms for carrying through protection initiatives are weak, possibly originating in a lack of advocacy across all relevant Government departments and the absence of unifying legislation. In fact the present laws concerning the reporting of wreck material originated in the 19th century to protect the interest of ship and cargo owners and are out of step with modern heritage management. These laws carry with them a perception of the acceptability of salvage of historic material for sale which is a situation that could be resolved by Government, should it have the will, via legislative amendment.

Progressive exploitation of the seabed is increasing the frequency of encounters with submerged heritage from the large scale such as North Sea submerged prehistoric landscapes, to the individual finds recorded under reporting protocols developed with marine industries.¹⁰⁶ These encounters show that the marine historic environment exists in a significant amount and that there is a great, under exploited, potential.

So what?

- The marine historic environment is poorly understood, little appreciated and used, and reference to it in management systems is low, with the result that benefits and opportunities are rarely taken advantage of
- If the marine historic environment is not adequately recognised in the current prevalence in environmental management towards the Ecosystem Approach¹⁰⁷ towards environmental management, then it will be further damaged by development and neglect
- Local communities and the population at large will not be given the opportunity to engage with their past and in the better preservation found in marine burial environments (relative to terrestrial) and the latter will not be investigated and used sustainably to improve our knowledge of the past

3.6 Economic growth

The 2008 economic crisis and its uneven impact placed pressure on both national and local decision-makers to stimulate growth. Pressure for economic success is a powerful influencer in both national and local decision-making and can override other concerns, such as the impact on heritage. Although threat to the historic

¹⁰⁶ <http://www.bmapa.org/issues/archaeology.php>

¹⁰⁷ <http://jncc.defra.gov.uk/page-2518>

environment is inherent (perhaps from re-development that affects the settings or fabric of historic buildings, or the impacts of growth at a landscape level more generally), there are clear opportunities for the heritage sector to manage the outflow from economic growth and to shape its impacts on the historic environment.

Government policies, aligned with low interest rates and a range of subsidies, are aimed at accelerating the process of growth for example green energy.¹⁰⁸ The policies include steps to deregulate the planning process making it easier for property owners to extend, renovate or rebuild, or through Permitted Development Rights¹⁰⁹ for conversion for use (commercial to residential being a case in point). We have seen local government funding more closely aligned with local prosperity, further incentivising local councillors to prioritise the economy in decision-making.

The pressure to build a vibrant economy will impact on heritage. The historic environment can be identified as a key element in supporting sustainable growth, as witnessed in places like Wakefield.¹¹⁰ Alternatively the pressure for short term growth may lead to the destruction of heritage assets or disruption to landscapes that can result from the pressure to develop. In addition, the fall in levels of protection that result from cuts to public spending, in particular those affecting local historic environment services, carry their own threats. Cuts to local services have forced many local authorities to explore different delivery options, including sharing services with other authorities, developing different charging models and identifying private sector partners. This increase in the variety of delivery models, as well as the varying levels of resourcing, have created an uneven patchwork of levels of heritage protection.

There are however, opportunities as well as threats. National government's targeting of tourism as a sector with the potential for growth has clear implications for heritage (heritage based tourism already accounts for at least £5 billion of GDP¹¹¹). The World Tourism Organisation recognises that nearly 40% of all international tourism is motivated by cultural heritage,¹¹² and the government's 'Britain is Great' campaign highlighted the key role that heritage has to play in attracting future tourists from emerging markets such as China. The management of the landscape, traditional buildings, and of vibrant and distinctive urban areas, will play a vital role in attracting home and foreign visitors, in addition to the better known heritage sites.

There will also be opportunities to positively engage with a wide range of partners, and to encourage sympathetic development or put in place curatorial regimes, such as stewardship agreements, that place economic value on the careful management of fragile environments.

¹⁰⁸ <https://www.gov.uk/green-deal-energy-saving-measures>

¹⁰⁹ <https://www.gov.uk/government/consultations/extending-permitted-development-rights-for-homeowners-and-businesses-technical-consultation>

¹¹⁰ Page 39, http://www.local.gov.uk/publications/-/journal_content/56/10180/4062539/PUBLICATION

¹¹¹ *The Economic Impact of the UK Heritage Tourism Economy*, Kareen El Beyrouthy and Andrew Tessler, Oxford Economics, 2013

¹¹² <http://ec.europa.eu/enterprise/sectors/tourism/cultural-routes/>

So what?

- Threats to assets, and the settings of assets, from the impacts of economic growth include:
 - damage to, or demolition of, significant assets
 - deleterious impacts on the settings of assets
- A failure to realise any gains for the historic environment, or professional sector, from reinvigorated economic growth
- Continued pressure on resources to respond to the challenges of change
- Given the major role that local government has in the conservation and management of the historic environment, the shifts in resourcing, structure and priorities of local authorities are potentially extremely significant

3.7 Information and social networking

The rise of virtual social networks and the easy access to information brought by the internet means that people are no longer dependent on geographically based networks. These developments are affecting work patterns, with home working, for example, set to rise in many areas. The effect of the '24/7' world is becoming more of a reality for heritage, with the need to adapt buildings to meet different functions over a 24 hour cycle. Increased pressure on land-use, in particular in the South East, may also result in increasing multi-functionality.

Developments in the use of technology have improved access to information and to decision making in ways which are, arguably, more democratic. Social networking and crowd-sourcing are increasingly being used as quick and inexpensive methods of engaging with communities and users of particular services. This may represent a challenge for 'expert advisors' in aligning the expert view with concepts of shared values. The ability of organisations to gauge and respond to the newly accessible views of the wider community will be crucial. For the heritage sector specifically, this extends to our ways of defining heritage (including intangible elements) through a values-based system and could lead to some fundamental debates on what and why we protect.

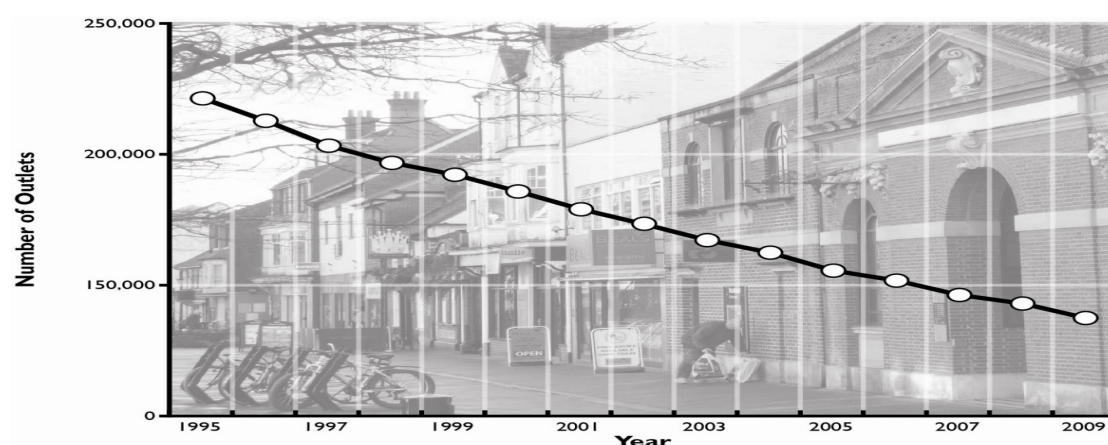


Figure 12: Local outlets: shops, banks and pubs 1995 – 2009. Source: New Economics Foundation

So what?

- Developments in broadband will accelerate trends in the residential use of farmsteads and redundant rural buildings in association with home-based businesses
- A predicted doubling in internet sales (from 9%) forcing more shop closures in the next decade (and conversion of retail and office space to domestic use) counterbalanced by an increase in 'click-and-collect' services and the resurgence of 'bespoke and leisure shopping' in historic town centres
- The blurring of work and home environments and associated migration to the countryside as long-distance connectivity and mobile smart technology enables flexibility of working
- The continuing rise of internet shopping is likely to increase the development of new kinds of virtual market places (such as E-Bay; Gumtree) with impacts on current shopping and businesses.
- An open source approach to knowledge developing further and in more fields of interest
- Engagement with the real world being substituted by the increasing creation of virtual worlds
- The continuing changing dynamic of the notion of community and the communities of interest versus communities of place
- The opportunity for the analysis of big data, and collaboration of sets of disparately owned data is significant

3.8 Identity and values

The characteristics determining who a person is create identity. Identity is however not a singular concept: it is multiple and layered, and it is highly contextual and culturally contingent, it can be used in reference to, and by, individuals or groups. As such it is not static, although it may become more stable in adulthood.¹¹³ It is, in fact, highly complex and increasingly derives from a combination of self-determination and imposition by others. It is affected by mobility of people (across international boundaries and more locally), accessibility of data, hyper-connectivity, ethnicity, race, religion, disability, sexuality, nationality, age, family, and financial factors (to name some). A late 20th century trend was the emergence of religious identity to largely replace ethnicity.¹¹⁴ Some analysis suggests an increasingly complex and plural society will lead to a less cohesive and less integrated one,¹¹⁵ although in isolation such factors are less likely to impact on concepts of national identity unless associated with economic deprivation and social immobility.¹¹⁶ This is sometimes

¹¹³ www.glimpses.community.librious.com/what-is-identity/

¹¹⁴ Daniel Nilsson DeHanas, Theresa O'Toole & Nasar Meer 'Faith and Muslims in Public Policy' pp/ 19-36 in *Faith with Its Sleeves Rolled Up*, ed D Singleton (London: FaithAction 2013), p.19

¹¹⁵ Future Identities: changing identities in the UK – the next 10 years, Government Office for Science, 2013,

¹¹⁶ Future Identities: identities in the UK – the next 10 years DR18: Is there evidence that national, and other, identities change as the ethnic composition of the UK changes? If so, how? Are there differences

perceived as a threat to the concept of community but may be countered by the development of communities of interest through on-line mechanisms and identities which in itself may further blur private and public identities. This and other responses to technology and our use of it continues to impact on social interaction and expectations, and crucially also on our perceptions of the pace of change (and by extension, how acceptable or comfortable this feels).

Identity and concepts around it are increasingly important: a Government Foresight report states that ‘understanding identity will be increasingly important for effective policy-making’.¹¹⁷ Furthermore it has an influence on well-being, itself increasingly considered as a means of measuring the impact of policy, and on the degree to which people can build on social capital. It affects people’s sense of belonging.

Some traditional identity-based indicators are shifting; most commonly cited as those concerning age and life stages (new transitional life stages) and place-based identity. Globalisation and urbanisation are both contributors towards a perceived detachment from place, added to which communities of interest are potentially as, if not more, important for many of us. Despite this common rhetoric however, place is still inextricably linked with who we are and people have strong connections with it. Like identity itself places are not stable but are constantly being renegotiated and understood in new ways by different people or by the same people at different times.¹¹⁸

Notions of identity do not just respond to place but impact upon it. An example can be seen in the proliferation of places of worship of diverse faith communities in the late 20th century. From approximately 400 mosques known around 1990, there are now around 1500. Such construction is rooted in ideas of cultural identity and belonging, with distinctiveness in design indicative of a confidence and a relationship with homeland cultures. Equally there is evidence of a demand to use history and with it material culture to develop individual and group identity and consider values within a national perspective.¹¹⁹ The built environment can through this and other means act as symbols of group and personal or local identity, and at the same time increasing diversity and devolution can strengthen the significance of national symbols.

between people from different ethnic groups? And of different ages/ social classes, David Owen, University of Warwick, January 2013

¹¹⁷ Future Identities: changing identities in the UK – the next 10 years, Report Government Office for Science, 2013, p 8.

¹¹⁸ Future Identities: changing Identities in the UK – the next 10 years DR6: How will environmental and place based change affect notions of identity in the UK over the next 10 years, Clare Twigger-Ross, Collingwood Environmental Planning, January 2013. p.5

¹¹⁹ English Heritage Disability project is one example of this, but with regard potential see for example The British Sikh Report p 14 2013 which states that 75% of British Sikhs want to know about British Sikh history and that not enough is being done to promote this through either Sikh or non Sikh organisations.

Identity is therefore central to values. Values determine how we behave and what we believe to be important. It defines what we find significant and why. The impact of cultural and social forces is full of paradoxes. The ability of the individual to make their voice heard (see above) is set against the risk of marginalisation that comes with concepts of 'shared values'. Socially and politically the values-based agenda continues to grow and impact on ways of 'seeing' and on ways of 'doing'. The challenge for the heritage sector will be how do we manage and value heritage in a way that reflects the increasingly heterogeneous nature of society, and how can we ensure that heritage protection agendas are properly reflective of that society?

So what?

- The social response to environmental change, shaped by government incentives, media coverage and values associated with responsible and sustainable living, will have an increasingly important role in policy making
- Identity will have an increasing role in public life
- The notion of community is often ill-defined or non-specific, but there is evidence of redefined concepts of community becoming increasingly relevant to debates on local and heritage issues
- As issues like identity and community change and adapt, the values placed on heritage, and the question of what people consider to be heritage, become increasingly important
- Disruptions and threats to place (whether through climate change or development) have implications for well-being and understanding this better is likely to influence policy
- National and local identities will shift as diversity increases and spreads out geographically and to smaller towns and suburbs
- Religious identity and the role of faith in public policy (as part of a values based agenda) is increasingly important

3.9 Professional skills

Skills development in the heritage sector is at present inefficient, patchy, under-resourced and limited in its accessibility. Labour market intelligence surveys¹²⁰ across the sector indicate that there are significant problems in both developing the skills of those in the sector and bringing new people into the workforce. In addition:

- Public sector cuts have resulted in a fall over 28% in specialist historic environment advice provided to local authorities since 2006 ¹²¹
- Post-2008, the downturn in construction has impacted on historic environment employment and service delivery, as well as specialist companies offering work-based learning in traditional craft skills
- 87% of contractors do not have a formal qualification relating to work on traditional (pre-1919) buildings

¹²⁰ A full list is available at <http://www.historicengland.org.uk/research/research-results/activities/2e1>

¹²¹ <http://www.historicengland.org.uk/images-books/publications/fifth-report-la-staff-resources/>

Additionally, the sector has a significant demographic issue. In a recent survey,¹²² 49% of respondents envisaged skills being lost without replacement within their organisation due to retirement. 56% identified this as an emerging problem within the next 5 years.

The professional heritage workforce is currently highly qualified with over 90% qualified to degree level and almost half of respondents to surveys commissioned for Heritage Counts 2013 holding a Master's degree. There are however increasing threats to the existing pathways to qualification. Many Continuing Education courses closed following the Equivalent and Lower Qualification ruling in 2007, effectively removing an access route for career changers. Fee increases are continuing to impact on student numbers in heritage subjects, a situation intensified by the focusing of resources on science, technology, engineering and maths. In archaeology an oversupply of sub-optimal courses is identified, leading to increased pressure on the "well-founded" courses which provide exposure to academic, scientific and practical skills.

At present, non- academic pathways into the sector are not well developed. There is a clear need to develop opportunities through vocational routes and in Further Education if we are to adequately provide historic environment education and skills training in the future.

On the craft side and in the last year (2013-14), there has been a 47% drop in entrants to the building trades that require full training, compared with 2007. Only 26% of employers consider it likely that they will recruit a trainee in the next five years, compared with 38% who had done so in the past five years. This reflects the present plateau on the construction side of the sector.

A significant proportion of the historic environment workforce is employed in small and medium sized companies who lack the time and/or resource to adequately invest in training their workforce. Additionally, the small organisations in both the craft and amenity society areas have seen a crippling decline in their core funding from public sources. This has left them dependent on project funding but without the resources to apply for or undertake projects. This threatens educational and promotional activity which is impacting on the supply pipeline of future talent. This is compounded by the effect of educational reforms at secondary level which have led to a concentration on the EBAC (English Baccalaureate) subjects. In the craft/design sector alone this has caused a loss of 33% of curriculum time.

However the increasing emphasis on work-based learning and the development of higher apprenticeships and stronger vocational elements in university courses, initiatives that are being encouraged by central government, offer considerable

¹²² The Historic Environment and Cultural Heritage Skills Survey TBR for CCSkills and English Heritage, 2013

potential for the future. Alternative training routes such as Flipped and Blended learning and MOOCs¹²³ are already emerging and they are offering opportunities to a 'tech-savvy' generation.

Employers are also engaging with the skills gaps and shortages inherent in the present system. Key areas of making qualifications more relevant to employment needs and stimulating demand for specialist skills are being addressed. Present circumstances offer a potential route to achieving a substantial reform of the qualification system to ensure greater relevance to the needs of the historic environment.



Figure 13: Students from the University of Sheffield excavating at the Iron Age site of All Cannings Cross, Wiltshire, Copyright Dave McOmish

So what?

- At present, non- academic pathways into the sector are not well developed
- The present content of academic courses does not adequately equip graduates with the skill sets needed for employment in the sector
- Conservation and the understanding of historic buildings are not covered in most architecture courses despite repair and refurbishment accounting for over 40% of the business of the average architectural practice
- The shrinkage of archaeological expertise following the downturn in construction post 2008 has led to shortages in experienced staff for fieldwork which is

¹²³ Massive Open On-line Courses

impacting on present projects and threatens the adequate undertaking of archaeological recording in advance of major infrastructure projects such as HS2, the Thames Tideway Tunnel and any airport expansion

- There is a lack of demand for accredited practitioners in most trade and professional areas: this compounds poor training provision
- The relatively small size of the sub-sectors making up the historic environment workforce means that qualifications are under continual pressure. The level 4 NVQ (National Vocational Qualification) in archaeology has recently been lost which will curtail the training opportunities for new entrants and up-skilled alike.

4 Responses

This section provides a strategic overview of the issues that we believe are the most pressing, as identified by evidence gathered in constructing the preceding sections. It is not an implementation plan nor does it attempt to dictate operations for Historic England. It should inform decisions about research needs and how best to direct resources both for the organisation and, ideally, the wider sector (other heritage bodies and local government).

Having identified the drivers for change in section 2 and then looked at the implications of those drivers in section 3, this section seeks to draw out how Historic England and the sector could respond to the issues and impacts identified. Firstly we identify more specific areas of focus, linked to the headings used in section 3. Section 5 then presents the range of mechanisms (both familiar and novel) that can be used to respond to these topics, illustrating each category of response with examples.



Figure 14: illustrating the potential tensions between the historic environment, economy, setting and climate change. (Photograph by Eric de Maré of the 19th century Grade II listed Church of St Edward the Confessor, Ferrybridge, Brotherton, North Yorkshire with the cooling towers of Ferrybridge 'B' and 'C' power stations in the background. Since the photograph was taken, during the 1960s, the nearest cooling towers have been dismantled.) Copyright © Historic England, NMR

4.1 Development

The planning system provides for historic environment considerations to be taken into account in decision-making about new development. Increasingly, and especially as one moves beyond individual heritage assets to consider landscapes (including townscape) more broadly, the issue becomes one of managing and shaping change, not trying to prevent it. This approach is enshrined in NPPF, which says that new development should take account of the existing character, distinctiveness and history of places. This can be seen as part of a wider shift in the way society sees the

relationship between past, present and future, the importance of landscape and place as a framework for integrating different disciplines and informing change everywhere being given added impetus by the 2014 Farrell Review of architecture and the built environment.¹²⁴

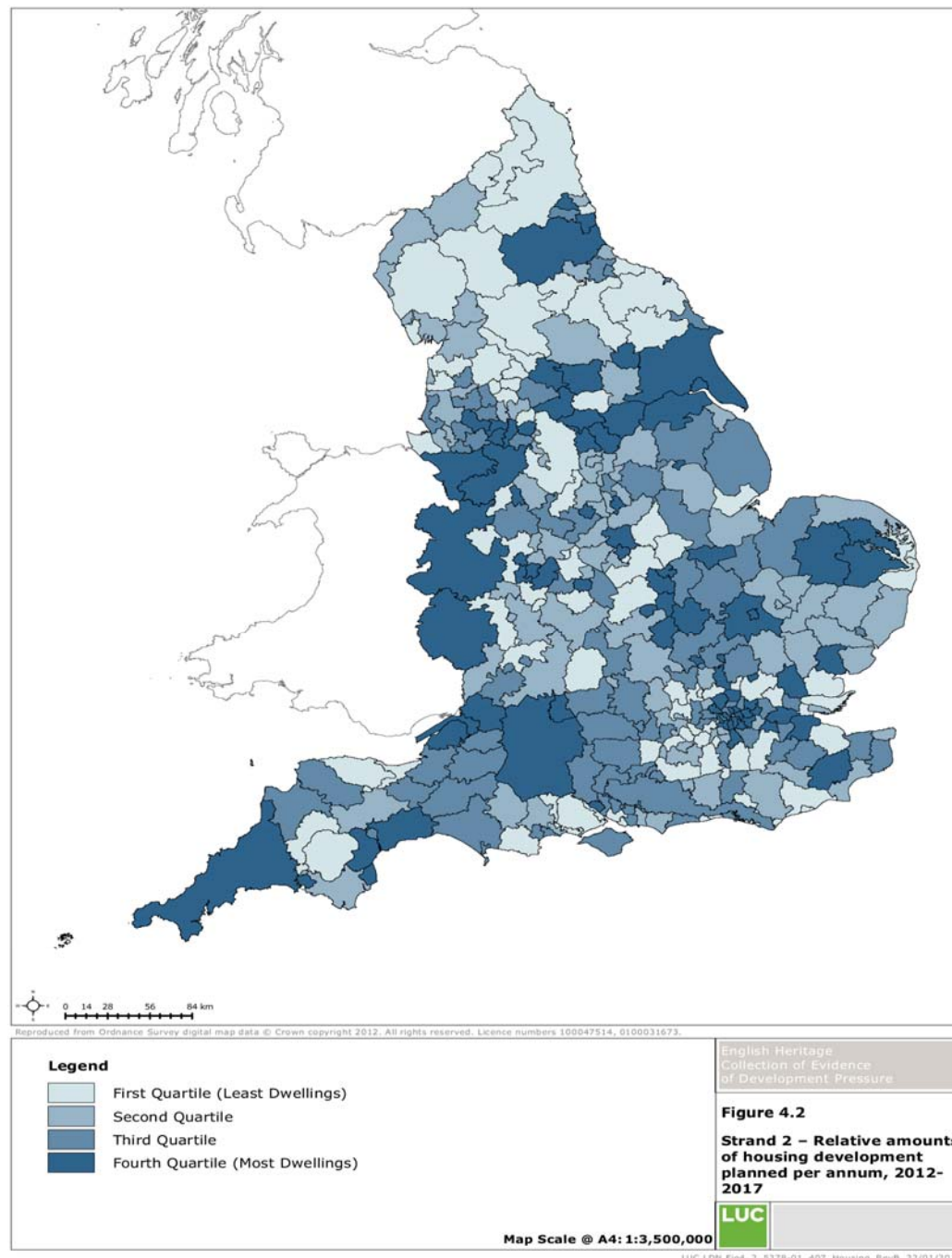


Figure 15: Public perception may well be of major planned housing developments in the South and South-East of the country, but the intended spread is national. Away from London and neighbouring local authorities, there is an anticipation and requirement for greater housing construction in the south-west, north and east midlands as well as the North East

¹²⁴ 'Instead of thinking purely about individual buildings and scheme, planners must think about Place'. 'Our Future in Place'. *The Farrell Review of Architecture and the Built Environment*. See <https://farrellreview>

4.1.1 *Housing*

The pressure to increase levels of house building does present opportunities for the historic environment. To respond to this challenge, we need to:

- Understand the potential impact of settlement change on landscape character, which can help the historic environment sector better understand the implications that this has for future growth, environmental and social change and its impact on the historic character of landscape and settlement
- Shape responses to developmental pressures for housing within urban, peri-urban and rural environments across a range of scenarios including
 - positively influencing masterplanning at the earliest stages of the development process, through a strategic understanding of future development scenarios and pressure points
 - helping to better flag the historic character, significance and value of the historic environment in programmes of regeneration (housing, industrial and commercial)
 - providing constructive guidance on how to develop and adapt different types of historic settlement and buildings in response to the scenarios for change
 - providing simple guidance for those undertaking neighbourhood plans, to help them identify heritage features, including the patterns of building and settlement in their landscape context, and plan for future change based upon understanding of the historic character, significance and issues for change in an area
- Use local patterns of architecture and settlement to plan for and inspire any environmentally beneficial new development which makes a positive contribution to local character, an issue which has again been raised in the 2014 Farrell Review
- Develop a strategic vision from the historic environment sector on how to inform housing growth, including the adaptation of the existing building stock and heritage assets in all areas in order to address the deep structural problems in the housing market (including strong divergences in the supply and demand for historic and new housing stock)

4.1.2 *Infrastructure*

Many of the large infrastructure works are still at the planning stage but there are opportunities to:

- Engage with the planning process such as that currently underway for HS2
- Influence strategic decision making
- Develop fruitful dialogue with decision makers
- Press for additional resources to properly respond to the development process

4.2 Landscape and resource exploitation

4.2.1 *Settlement pattern and form*

Until recently, heritage protection has focussed largely on individual items (buildings, monuments or limited areas). Now, we have a broader view ('the historic environment'), but we have not yet fully developed and articulated our responses to proposed change at these wider scales. To what extent can the existing qualities of

historic places be maintained, while changing them to meet modern needs? This challenge can be acute in historic town and city centres, where the existing patterns of plots and spaces may be at odds with perceived modern requirements (e.g. for retail space), but is also present in rural settlements (e.g. in relation to village infill) and rural landscape ('greenfield' development).

- In each case, the answer may lie in focussing more on the basic structure of the places we deal with:
- How have settlements developed within their landscape context?
- What is the pattern of plots and streets in a town, and how has it evolved?
- How do open spaces in or immediately around a village contribute to its overall character?
- How is a landscape structured, in terms of its main boundaries and axes of movement?

Overall spatial structure tends to be one of the most durable aspects of places (much more so than individual buildings, say). A good understanding of the way in which places have reached their present form, combined with sensitive but imaginative master-planning, is probably the best way to create places of distinction and character, and ones which will work and endure for the long term. In terms of place-making, this seems far more important than (say) adding vernacular details to new buildings, the layout of which derives little or nothing from their context and the past of the area.

4.2.2 *Agriculture*

Use understanding of historic character and significance at national and local levels to identify opportunities to shape the delivery of the Rural Development Programme for England (RDPE) including through:

- The development of strategic and interdisciplinary approaches to identifying future patterns of risk, and proactively shaping future landscape character, including through appropriate levels of protection and the recovery of archaeological information
- Engaging with the Ecosystems services approach in order to identify opportunities for maximising the benefits provided by the historic and natural environment, including the enhancement of landscape character and heritage features in addition to the networks and mosaics of habitats for biodiversity, the conservation of historic features and climate change resilience
- Specific technological developments such as informing the adoption of precision farming using GPS and GIS mapping and modified crops which can enable specific management or avoidance of sensitive areas and sites
- The adaptation of traditional farm buildings to retain them in beneficial use and encourage commercial uses in support of diversification, including through the Local Economic Partnerships and focusing on upland and other areas where there are high survivals of traditional farm buildings. Diversification is critical to the future of these farmed landscapes
- Develop sustainable uses through pilot surveys with landowners and the use of appropriate pre-application guidance, recognising also the fact that the

residential use of farmsteads can accommodate significant, and until now largely hidden, business activity

- Using the repair of traditional buildings to encourage traditional skills, and benefits for local economies, through the RDPE and liaison with colleges, estates and other owners

4.2.3 Woodland and forestry

Use the identification of heritage features and the conservation which conserves heritage to:

- Shape woodland expansion and management through a strategic understanding of the expected changes to and archaeological potential of historic woodland in its landscape context
- Increase understanding of archaeological features for informed planting, harvesting and management within woodland, which has been subject to relatively little survey and research
- Inform new approaches to the understanding and management of traditional orchards, including the retention of significant archaeology, buildings and settlements and for conserving their genetic diversity
- Develop and contribute to understanding of the impact/benefits of new woodland at an appropriate scale in relationship to a) local communities, b) historic environment interests¹²⁵ and c) habitat interests.¹²⁶

4.2.4 Minerals

- Continue to develop the evidence base, including the integrated and strategic assessment of the natural and historic environment sought by key stakeholders from industry to Minerals Planning Authorities (MPAs), including integration of mineral resources into the Ecosystem Services Approach
- Develop a 'national map' of historic stone and slate use and distribution, and future trends in supply and maintenance priorities, that builds on the results of the Strategic Stone Study and considers how the latter can be completed.
- Work with the minerals industry to analyse emerging trends and developments in order to develop a future minerals strategy for the historic environment.
- Continue to work with the UK Minerals Forum, the British Geological Survey (BGS) and other key partners to address inconsistencies in the evidence base and planning delivery and secure the benefits that the industry provides to the historic environment through research and archaeological investigation.

4.3 The environment

Some responses to environmental change can be classed as low risk, because they will improve protection from extreme weather events that are already happening. These include:

- Prioritising maintenance to ensure buildings are weather-proof

¹²⁵ Such as through field guides and programmes aimed at identifying relevant heritage features in their landscape context

¹²⁶ In particular the potential of enclosed land and the constraints to new planting of semi-natural habitats such as species-rich grassland)

- Increasing the capacity of drainage systems at roof and ground-level
- Increasing the capacity of water harvesting and storage to enhance water security for vulnerable assets

Other actions, however, have a greater risk embedded because they require a philosophical shift in the level of adaptation of a place that we might find acceptable, e.g.

- Changes in land management in upland and lowland areas to enhance flood protection
- Changes in coastline management to enhance protection from flooding and coastal erosion, but also to abandon defence in some places
- Changes to historic buildings in areas of high flood risk

Other responses, fall outside of this categorisation:

- A risk assessment of the vulnerability of particular types of asset to particular processes is needed¹²⁷ to understand the scale of problems that might be encountered and prioritise places at greatest and/or most immediate risk
- Improving the profile of heritage within an increasingly tense debate about what should be protected, where and how; the environment has multiple competing demands placed upon it, providing space for nature, agriculture, industry, business, energy, leisure and living set against an imperative for economic growth
- Ensuring that new tools being developed to assess these different demands on the environment incorporate evidence that demonstrates the value of heritage to the economy and individual well-being is fundamentally important if we are to ensure that it is adequately accounted for in future decisions on what it is worth protecting

Lastly and perhaps most controversially, is the need to accept that it is not viable in the medium to long term to protect some assets and landscapes, in some places, from being lost. Integral to such an understanding are strategies for assessing when this is the case and for consulting and communicating with relevant communities on these strategies.

4.4 The marine environment

- Continue the programme of development of the National Heritage List for England's maritime component and boost initiatives to make the relevant data available to local authorities and Historic Environment Records (HERs) in order to provide information for local, community based awareness
- Develop on the ground, practical opportunities for communities to engage with their immediate coastal and inter-tidal heritage, and, where appropriate the adjacent submerged assets

¹²⁷ see for example, Hunt, A (2011) English Heritage Coastal Erosion Risk Assessment; Pearson, T (2013) English Heritage Inland Flooding Risk Assessment.

- Seek ways to improve the recognition of the marine historic environment in cross-environment planning structures (i.e. terrestrial, inter-tidal, and marine)

4.5 Economic growth

- Continue to influence decision makers through highlighting the economic contribution that regulating and conserving the historic environment can make to places, both at a national and local level: this will require the further development of both national evidence (continuing the joint sector work in Heritage Counts) and locally through case study evidence which includes monetised value of investment
- Highlight the inherent sustainability of involving historic environment concerns in local planning related decision making
- Continue to place heritage at the centre of England's tourism offer through both direct investment in assets and through advocating the contribution it makes using hard evidence
- Influence and raise the profile of the historic environment in the developments that accompany economic growth. This can be facilitated by making sure that there is an appreciation of the significance and value of heritage in those places affected and have appropriate pre-development assessments in place alongside suitable mitigation strategies
- Ensure that, in terms of structures and resourcing there is adequate consideration given to the impact of change on the historic environment by local authorities as part of the planning process.

4.6 Information and social networking

- Identify trends and predict further changing expectations of access and availability of information relating to the historic environment
- Understand expectations and needs for connectivity of information relating to the historic environment and integration with other information sets
- Improve utilisation of communities of support and interest promoting and developing engagement with associated lobbying and funding – enabling specific causes and issues to be developed more and faster than before
- Capitalise on developments in digital technology and social media will enable people to engage with places in more dynamic ways that can also better integrate understanding of the natural and historic in everyday environments, setting out the scenarios for change and a framework for local and national debate

4.7 Identity and values

Greater awareness of the role of identity and values in people's engagement with the historic environment and its protection is becoming increasingly urgent as issues such as 'significant to whom' become more important.

- Develop tools to help manage the identification of significance within the historic environment and priorities for protection based on wide-ranging and locally held values
- The trend is for government and policy makers to focus on green spaces and the countryside with regard well-being and shared values: debates on urbanisation and development and the inherent qualities of the historic built environment should be developed as part of the acknowledged well-being agenda
- Better understand the role of the built environment in the formation of personal and local identity would support relevant areas for Historic England.

4.8 Professional skills

In recent years there has been an increasing realisation amongst employers that the established training routes and the emphasis placed on academic qualifications has compounded an existing skills gap in new entrants to the historic environment trades and professions. This has led to a re-evaluation of practical, work-based routes to skills development.

- Working with Higher and Further Education providers to ensure that adequate historic environment education and skills training is provided in the future.
- Working with education sector to expand awareness of careers in the heritage sector
- Ensuring that the historic environment sector employers are capitalising on governments increasing emphasis on work-based learning and increased vocational elements in other courses
- Working with the sector to maximise the use of labour market intelligence to address historic environment skills gaps and addressing the key areas of making qualifications wholly relevant to employment needs
- Working to maintain and develop craft skills and expertise in traditional construction and repair methods
- Working to establish Apprenticeship and Higher Apprenticeship routes to skills acquisition in the craft and historic environment sectors through engagement with Apprenticeship reform in order to provide a more appropriately skilled workforce
- Forging strong cross-sectoral partnerships to engage with issues of training provision and methods of stimulating client demand for suitably qualified practitioners

5 Preparing for Practical Outcomes

The analysis in chapters 4 and the practical outcomes in this chapter provide the evidence which supports and reinforces Heritage 2020 as the sectoral plan for the next five years. Within the context of Heritage 2020 it is possible to see how these actions can be coordinated under different themes of activity, and thus how they can be transmitted into organisational action plans of a wide range of bodies involved in the historic environment, not least Historic England after 1st April 2015.

Coupled to a regular review of drivers and issues (Chapters 2 and 3), and a regular review of impact of the organisational action plans, this completes the cycle by which long-range foresight is fed consistently into the development of short to mid-term planning.

5.1 Understanding change: Building the evidence base

Research activity is a key element of delivering the agenda for action. In addition to the requirement for knowledge of the drivers for change, it will be important to understand the capacity of the historic environment to accommodate change without losing significance, and the circumstances and behaviours that lead to support for, or resistance to change. More specifically, the agenda points towards the following research topics:

5.1.1 *Identity and values*

Using national and local demographic studies to begin to develop an understanding of how demographic change is affecting societal values and how these may in turn be affecting the historic environment. Following this it will be possible to develop tools to help people see how their sense of identity and values are influenced by and can influence the historic environment and, through setting out scenarios for future change, the options for its protection. Allied to this is the need to better understand the role of the built environment in the formation of personal and local identity and how this could support relevant areas for Historic England and the wider historic environment.

5.1.2 *Sensitivity and Design*

Understanding what qualities of historic places can and should be maintained, while changing them to meet modern needs. This challenge can be acute in historic town and city centres, where the existing patterns of plots and spaces may be at odds with perceived modern requirements (e.g. for retail space), but is also present in rural settlements (e.g. in relation to village infill). In each case, the answer may lie in focussing more on the development of the place as a whole rather than as individual assets.

Understanding where significant change to the historic environment is likely to happen, whether this is by natural or manmade processes. Mapping, at a variety of scales from national to local, the natural (eg flooding, erosion) and manmade (eg housing and infrastructure allocations) agents of change and how these interact with known historic environment assets. It should be recognised that significant impacts can be brought about by the result of a single action or the steady accumulation of lesser impacts over a longer period of time.

Use strategic data (e.g. local plan housing allocations; population change) on the potential impact of settlement change to help the historic environment sector to influence the options for future growth, environmental and social change, and develop responses that are strategic, interdisciplinary and proportionate to its impact on the historic character and significance of landscapes and settlements.

Develop approaches to the adaptation of different types historic buildings and landscapes to retain their significance whilst realising beneficial and/or commercial uses and a sustainable future.

5.1.3 Economic and other benefits

Collect and refine the evidence for the major contribution that England's nationally and locally distinctive heritage makes to England's tourism offer, including demonstrating the benefits of direct and indirect investment in the maintenance and enhancement of heritage assets and places. There's a need to develop links with other sectors (eg tourism; property) to refine and understand how and what aspects of the historic environment contribute to economies at local and national levels. In addition there needs to be further development work to explore the potential links between the historic environment and well-being.

5.1.4 Analysing Good Trend Data

Alongside the need to understand the historic environment resource there's a need to enhance and develop our understanding of how the major drivers for change will be impacting on the historic environment and mapping it, and how this may be changing over time. The Government and its agencies are a major source of trend data, for example CLG collect planning data on an annualised basis and ONS analyse and publish population and demographic data based upon the regular census data. There are cases when English Heritage working with the sector have invested in the systematic collection of data in order to build up datasets, an example of this would be the labour market surveys (eg profiling the profession)

5.2 Conservation and Management

Protection of the fabric and significance of the historic environment is brought about by a number of interlinked responses which include the application of legislation

(designation and consent processes), place shaping and the use of Constructive Conservation.

5.2.1 Contribution to master planning

Shape responses to developmental pressures for housing within urban, peri-urban and rural environments across a range of scenarios including helping to better flag the historic character, significance and value of the historic environment in programmes of regeneration. For instance using local patterns of architecture, materials and settlement to plan for and inspire any environmentally beneficial new development which makes a positive contribution to local character, an issue which has again been raised in the 2014 Farrell Review.

5.2.2 Ecosystem services

Engaging with the Ecosystems services approach (marine and terrestrial) in order to identify opportunities for maximising the benefits provided by the synergies between the historic and natural environment. Potentially enhancing landscape character and heritage features in addition to the networks and mosaics of habitats for biodiversity, and the conservation of historic features alongside climate change resilience.

5.2.3 Tracking change

Proactively working with industries, such as energy generation, to monitor and analyse emerging trends and developments in order to develop strategic understanding of expected changes, leading to future strategies which encompass the historic environment and minimise any impacts on it.

5.3 Engagement with others

Protection of the historic environment will only succeed if and when we convince others of the contributions it can make to their lives now and into the future. It is important that we are seen to be proactive in our engagement with the many different audiences that engage with it in many different circumstances.

5.3.1 Owners and managers

A vital part of heritage protection is the direct engagement with those who own and/or have a direct responsibility for historic assets and historic landscapes together with those who are responsible for management of the processes of change. This list is predictably varied and includes individual owners, the business community, local planning authorities, local communities, special interest groups and the general public. Provide constructive guidance, including actual exemplars on how to develop and adapt different types of historic settlement and buildings ensuring sustainable uses into the future.

Engaging with real and virtual communities of support to promote and develop engagement enabling specific causes and issues to be developed in greater depth and faster than before. Develop on the ground, practical opportunities for communities to engage with the heritage of their area, especially where that heritage may not be easily understandable, such as coastal and inter-tidal landscapes and the adjacent submerged assets.

5.3.2 Neighbourhood Planning process

Providing simple guidance and appropriate training for those undertaking neighbourhood plans, to help them identify heritage features, including the patterns of building and settlement in their landscape context, and plan for future change based upon understanding of the historic character, significance and issues for change in an area.

5.3.3 Digital technologies

Capitalise on developments in digital technology and social media that will enable people to engage with places in more dynamic ways that can also better integrate understanding of the natural and historic in everyday environments, setting out the scenarios for change and a framework for local and national debate. Continuing engaging with specific technological developments such as informing the adoption of precision farming using GPS and GIS mapping and modified crops in order to enable specific management or avoidance of sensitive areas and sites.

5.3.4 Marine record

Continue the programme of development of the National Heritage List for England's marine component and boost initiatives to make the relevant data available to local authorities and HERs in order to provide information for local, community based awareness

5.3.5 Significance

Develop tools to help manage the identification of significance within the historic environment and priorities for protection based on wide-ranging and locally held values becomes increasingly important

5.4 Skills and capacity building

The understanding and on-going protection of historic landscapes and heritage assets requires the proper application of skills. The retention and development of the wide range of skills is, therefore, vital.

5.4.1 Labour Market Intelligence

A key aspect of this is to maximise the use of labour market intelligence from different historic environment sectors to build up a picture of the overall historic environment labour force. This will enable the identification and addressing of current skills gaps and in combination with other foresight data allow for the early identification of developing skills gaps. Using this intelligence to work with providers (Further and Higher Education) to ensure that courses and qualifications offered are wholly relevant to the labour force and current and future market needs.

5.4.2 Developing understanding in allied sectors

Developing the market in the necessary skills that lead to an understanding of traditional materials and how to use them appropriately. Ensuring that there is a skilled workforce who can specify repairs and modifications to historic assets correctly, particularly buildings, and that they are carried out using historically appropriate materials and methods.

5.4.3 Identifying opportunities

It's necessary to maintain an overview and understanding of the many different routes available for developing skills and building capacity and appraising those for their suitability to the historic environment sector. Allied to this is the development of our links with the 'owners' of these routes and the relevant sponsoring government departments.

Helping ensure that the historic environment sector employers are capitalising on governments increasing emphasis on work-based learning and increased vocational elements in other courses

Working to establish Apprenticeship and Higher Apprenticeship routes to skills acquisition in the craft and historic environment sector through engagement with Apprenticeship reform in order to provide a more appropriately skilled workforce.

Develop tools to help manage the identification of significance within the historic environment and priorities for protection based on wide-ranging and locally held values becomes increasingly important

Building on established, and developing new cross sector partnerships to engage with issues of training provision and methods of stimulating client demand for suitably qualified practitioners

5.5 Advocacy and influence

A critical task for the historic environment sector, perhaps now more than ever, is to highlight the contribution that the historic environment makes to everyday life and thereby emphasise its continuing importance and relevance within the modern world. This means outlining the contribution it does and could make to the social, cultural and economic well-being of England, especially but not exclusively to decision makers from the private, civil and public sectors.

5.5.2 Contribution to Economic growth

As national and local government policies continue to stress the importance of economic growth we need to continue to seek to influence individuals and groups, including those decision makers, through improved evidence, highlighting the economic contribution that the historic environment can make to places, both at a national and local level. While the importance of building houses remains intimately linked with economic growth by the Government there is a need to develop a strategic vision from the historic environment sector on how it can contribute to and facilitate the levels of housing growth expected. This will include the adaptation of the existing building stock and redundant heritage assets, as well as ‘green and brownfield’ developments, in all areas in order to help address the strong divergences in the supply and demand for housing stock.

Influence and raise the profile of the historic environment in the developments that accompany economic growth. This can be facilitated by making sure that there is an appreciation of the significance and value of heritage in those places affected and have appropriate pre-development assessments in place alongside suitable mitigation strategies

5.5.3 Managers of change

Working with others to recognise that public sector bodies, mainly local government, have a responsibility for managing change in the historic environment. There’s a need to understand the changing nature of public sector and how this may impact upon their management of the historic environment. Developing tools that support public sector organisations in maintaining adequate levels of understanding leading to protection for the historic environment. Taking account of changing roles of the different agencies, paying particular focus to the move away from a homogenised national picture.

Shape strategic decision making stages for housing, commercial and infrastructure planning through a strategic understanding of future development scenarios and pressure points. Seek to influence Government and its agencies that impacts on the historic environment are taken account of, and minimised, whilst they are developing and implementing legislation.

In response to the increasing demands being placed on land by agriculture, energy, industry, and the pressure for growth, strengthen the case for heritage protection within an increasingly tense debate of what should be protected.

We should recognise that in some cases it is not only the driver itself that could have impacts on the historic environment; it is how others respond which may have detrimental impacts on the historic environment. There is a need to work with other sectors whose actions could have impacts upon the historic environment to understand how they are planning to react to these drivers, and give them relevant information such that they take the historic environment into account whilst developing their planned responses.

We should develop our understanding of situations, such as coastal erosion when mid or long term protection is not a viable option. Technical advice, mitigation strategies, public dissemination as well as the language and philosophy of unavoidable loss are all areas that require immediate attention to help improve our ability to deal with and understand loss. This is equally relevant for incremental as well as catastrophic change.

A prerequisite of protection of our historic environment is an understanding of the resource(s) and how they accommodate and respond to change. It is not just about responding to physical pressures as they occur. It is as much about responding to the circumstances and behaviours that lead to change. Understanding the context for change enables a more holistic and strategic set of responses.

Conclusion

This report is intended to stimulate debate and start engagement with Foresight within Historic England and the historic environment sectors. It is built on evidence gathered from a wide range of robust sources and its value lies in the trends and implications that have been identified which will inform the development of the next iteration of Heritage 2020 and organisational action plans.

Some of the evidence presented should prompt questions about whether existing strategic priorities are correctly balanced or whether there are other, alternative opportunities to better protect and manage change in the historic environment. Some of these choices may be difficult or even unpalatable; and which options gain prominence will be determined by the remit of individual organisations; but there are opportunities to better deploy resources whilst improving the protection outcomes.

One overall conclusion that can be drawn is that traditionally the historic environment sector is better at engaging with trends that impact directly on the fabric of the historic environment, for example development and climate change. This is in direct contrast with the less tangible trends that are being driven by social and behavioural changes in individuals and society, and which should be addressed in forthcoming iterations of successive heritage sector priorities, such as Heritage 2025.

This report integrates with the five yearly cycle of assessment and refreshment of these plans and it will appear at these intervals. It is important to recognise that there is a continual process of intelligence gathering, horizon scanning, trend analysis and assessment being undertaken by which we are monitoring those established drivers and trends while identifying new trends and implications.