



Historic England

Second National Infrastructure Assessment: Call for Evidence

Historic England Consultation Response

Historic England is the Government's statutory adviser on all matters relating to the historic environment in England. We are a non-departmental public body established under the National Heritage Act 1983 and sponsored by the Department for Digital, Culture, Media and Sport (DCMS). We champion and protect England's historic places, providing expert advice to local planning authorities, developers, owners and communities to help ensure our historic environment is properly understood, enjoyed and cared for.

We welcome the opportunity to submit a response to National Infrastructure Commission's call for evidence in relation to the Second National Infrastructure Assessment.

Question 1: Do the nine challenges identified by the Commission cover the most pressing issues that economic infrastructure will face over the next 30 years? If not, what other challenges should the Commission consider?

The challenges identified in the Second National Infrastructure Assessment: Baseline Report which are most relevant to Historic England are:

- Challenge 3: Heat transition and energy efficiency.

Historic England has prepared [guidance and advice](#) on increased energy efficiency in pre-1919 buildings.

- Challenge 5: Asset management and resilience.

An asset management response to resilience is likely to include decommissioning of infrastructure which is no longer fit for purpose or resilient to future climate pressures.

The potential scale of the decommissioning programme and number of heritage assets involved requires a strategic approach to their ongoing protection, conservation and enhancement which is not addressed within this challenge. Further details are set out in our response to Question 13.

- Other challenges for consideration.

A further challenge to consider is the accelerated rate of infrastructure delivery required to meet net zero targets and the associated cumulative impact of those schemes on the historic environment. For example, in the context of increasingly ambitious targets for offshore wind the challenge will be how to achieve growth in capacity to meet 2030 and 2050 targets whilst being cognisant of the cumulative impact accelerated infrastructure development from all sectors has on the environment.

Additionally, it would be beneficial to add a challenge on Water Infrastructure: Supply and Sewerage. Our approaches to running water supplies and sewers

into and around buildings have evolved piecemeal since the first London sewers in the mid-19th century and also require consideration. At all levels of water infrastructure, from water mains to plumbing for heating and bathrooms, there are potentially many ways to reduce leakage, to locate leaks quickly, and to ensure that leaks do not cause serious damage when they do occur. Although there is much good work being done, especially around sustainable drainage, there is at present no central body of expertise to look holistically at all aspects of the problem and determine what constitutes best practice for each type of water infrastructure and embed that better practice into building regulations and other control measures. The National Infrastructure Commission is well placed to bring together an expert working group to develop practical recommendations to deal with this critical but underappreciated aspect of infrastructure.

A final point to note is the scope of the Baseline Report which adopts a narrow view of environmental matters, focusing on the natural environment in relation to climate challenges and bio-diversity net gain. Historic England would like to see greater integration of the historic environment within environmental principles and impacts¹.

The Baseline Report recognises the reliance on nineteenth century infrastructure. Its legacy and importance to the nation's historic environment is often overlooked. It is important to understand the significance of historic infrastructure and its contribution to our cultural landscapes and diverse historic environment. Its value is acknowledged in the National Infrastructure Commission's Design Principles for National Infrastructure (page 3). Understanding the importance of the historic environment and the future approach to managing such heritage assets through applying a holistic view of the natural and built environment can achieve a broader range of benefits overall.

Question 3: How can better design, in line with the design principles for national infrastructure, help solve any of the Commission's nine challenges for the next Assessment and what evidence is there to support this? Your response can cover any number of the Commission's challenges

The Design Principles for National Infrastructure (Design Principles) encompasses the natural and built environment and this interpretation of the environment should be extended to the Second National Infrastructure Assessment when evaluating and making recommendations on the nine challenges identified in the Baseline Report.

Applying the holistic approach used in the Design Principles allows for a comprehensive assessment which takes account of the four principles (climate, people, place and value) leading to stronger outcomes. There is the opportunity for the people and place design principles to be used to better integrate historic environment considerations in the following way:

- **Place**

England's cities, towns and countryside are the products of change over a long period of time. The character of places where we live, work and travel give a

¹ See National Planning Policy Framework paragraph 8c.

sense of identity. It is inherently historic, expressed through such things as patterns and periods of building styles and materials, street and road layouts, other forms of land use and use of space. In combination, they reflect an area's change and development through time.

Change is essential to maintain a healthy society and thriving economy, but it also requires informed management to maintain or enhance the character of places and sense of identity, if we are to fulfil the social and economic benefits that flow from their cultural distinctiveness.

- **People**

An understanding of the range of values people attach to places is a key element of evaluating historic character when planning and designing infrastructure solutions.

There is a great deal of data² that underscores the important part that heritage plays in people's appreciation of the places they live, work in, or visit and the multiple health benefits the historic environment brings to local communities.

Applying the Design Principles and integrating the historic environment can help achieve practical solutions as highlighted in the examples below.

- **Challenge 1: Digital Transformation of Infrastructure**

Canals and fibre optic - In the mid-1990s British Waterways (now the Canal and River Trust) entered an agreement with Fibreway for new fiberoptic cabling to be laid under canal towpaths. The Canal network is a great legacy of the industrial revolution creating routes through and between towns and cities across England stretching out into many rural areas. Using these routes saved considerable cost and time compared to laying cable along roads, where other infrastructure could have been disturbed. In return the Canal and River Trust received a £250,000 annual payment that contributed to the cost of maintaining the canal and towpath network as valuable space for communities.

Church Towers and 5G - Church towers are now a recognised option for hosting antennas, making use of some of the most highly grade historic buildings to deliver the most up to date technology. Using the existing highpoint has helped to avoid the need for intrusive masts in historic locations across the country, as well as providing a rental income that helps support the maintenance of the most loved buildings in our communities.

- **Challenge 2: Decarbonising Electricity Generation**

Windfarms and Historic Harbours - Providing renewable energy from offshore wind is one of the opportunities for the UK to provide sustainable, renewable energy from our natural resources. As a maritime nation many of our coastal towns have a strong link with the sea represented in their historic ports and harbours. Orsted Energy now maintain the Hornsea 1 and Hornsea 2 wind farm from their permanent base in the Royal Dock, Grimsby, whilst Vattennfal maintain

² <https://historicengland.org.uk/research/current/social-and-economic-research/wellbeing/> and <https://historicengland.org.uk/content/heritage-counts/pub/2014/value-impact-chapter-pdf/>

the London Array from the Royal Harbour, Ramsgate. Both sites are made up of a mixture of Grade I, II* and II listed buildings that have demonstrated their adaptability.

The River Thames Old Mills and Weirs - In 2011 the first hydropower turbine to be built on the River Thames was unveiled, reusing the last waterpower mill on the river. The watermill, listed at Grade II*, now supplies power to the Mapledurham Estate and the national grid. Other mills converted to provide hydroelectricity include Osney Mill Oxford. This scheme demonstrated the potential for generation that gave confidence for the subsequent community owned and crowd funded Osney Lock Hyrdo scheme, which opened in 2015. An estimated 200 former mills and weirs in the Upper Thames region have potential for hydroelectricity generation representing a considerable potential of renewable energy - particularly during the winter months. This could be extended to old mills located along other riverine systems.

- **Challenge 3: Heat Transition and Energy Efficiency**

Canals and rivers provide opportunities for heat decarbonisation through water source heat pumps such as the scheme at Osney Island, Oxford. Where waterways are adjacent to new development sites this offers the potential for district heating infrastructure.

- **Challenge 6: Surface Water Management**

Understanding the historic patterns of land uses that were designed to benefit from flooding (such as water meadows used for brief periods of controlled flooding) could help make better use of the inherited landscape as well as increasing yields from land usually considered as of poorer quality.

Design considerations are about more than what infrastructure should look like, it is about understanding what is needed and the best way to deliver it. In summary Historic England considers the following principles can guide design of innovative infrastructure solutions and form part of the approach when addressing the nine challenges:

1. The opportunity to use the inherited landscapes to deliver infrastructure solutions.
2. Understanding the heritage significance of infrastructure so that it may be conserved and put to new use alongside replacement infrastructure (via asset management strategies).
3. The added benefits that can be provided through enhancement of the historic environment in relation to new or updated infrastructure schemes.

Question 9: What evidence do you have on the barriers to converting the existing gas grid to hydrogen, installing heat pumps in different types of properties, or rolling out low carbon heat networks? What are the potential solutions to these barriers?

Energy demand is not just a buildings-based issue and requires understanding of all types of energy demand within properties combined with an appreciation of future changes driven by:

- A decreased demand for heating due to a warming climate;
- A shift in thinking about heating approaches and a move away from 'space-heating';
- The use of energy-intensive air-cooling technologies; and
- Buildings based thermal and cooling solutions which may impact the building fabric and result in higher energy demand.

The emphasis on reducing and decarbonising energy use in the built environment should seek to understand where and why energy is currently being used by occupants, and how to reduce that use to a minimum whilst supporting the usability of the building to the maximum extent (where possible using passive zero-carbon zero-energy methods). Steps can then be taken to decarbonise the remaining (but necessary) uses of energy in and around buildings.

In response to the solutions listed above:

- Hydrogen – This is an emerging technology and logistics suggest it may be more appropriate for transport and to supplement a low-energy power grid.
- Heat Pumps – Long term viability is a key consideration, as is the impact on significance for designated buildings and/or landscapes. The competition for the same resource also needs to be considered where there is higher demand (such as in cities). Flooding is also an important consideration and can directly affect heat pump systems, making them less suitable in flood-risk areas (where climate change will intensify such risks). Heat pumps may be a useful tool when paired with low-temperature heating. The potential of hybrid systems (for hot water, cooking etc) still need to be considered in light of user needs and a warming climate.
- Low carbon heat networks – In some situations these may be a useful tool but will need to be part of a hybrid solution to take account of the need to reduce energy use, changing user needs, and a warming climate.

Question 10: What evidence do you have of the barriers and potential solutions to deploying energy efficiency in the English building stock?

The barriers to achieving energy efficiency in the existing building stock originates from poor knowledge of the operation of building envelopes from sectors involved in the built environment, and a poor appreciation of the occupant element of building performance (i.e. the way the building is occupied and the services occupants install).

This leads to issues such as:

- Poor or faulty maintenance and repair, with buildings behaving sub-optimally which is compensated by increased energy demand.
- A misunderstanding of the sources of thermal discomfort.

- Unnecessary or faulty retrofitting that can have a carbon cost and higher energy demand.
- Failure of otherwise well-designed retrofit measures due to issues such as trapped moisture.
- Retrofit measures which make a building less usable in a hotter climate.

There are a range of solutions to address these issues³. Historic England has extensive [guidance and advice](#) on energy efficiency of historic buildings including [How to Improve Energy Efficiency](#). Any solution has to be underpinned by an understanding of what is trying to be done and why there is a problem in the first place, supplemented by monitoring and post-occupancy evaluation.

Skills development combined with a broader definition of retrofit which takes a more nuanced approach accounting for the specifics of the buildings and the way it is being used is important. This requires a move away from a narrow 'fabric first' or 'deep retrofit' approach. Above all, ways of learning from good and bad outcomes need to be found and how that learning is fed back into improved practice⁴.

Question 13: In what ways will current asset management practice need to improve to support better infrastructure resilience? Your response can cover any number of the Commission's sectors.

The Baseline Report highlights concern about the condition of infrastructure assets in some sectors. Chapter 3 acknowledges reliance on infrastructure built in the nineteenth century and that older components are at greater risk of failure compounded by maintenance and replacement not keeping pace with the rate of deterioration.

The challenges of climate change and the need for infrastructure which meets modern design standards of resilience may result in substantial decommissioning of infrastructure which has historic significance. Asset management strategies which include decommissioning, taking account of climate change resilience, should also include how legacy infrastructure of historic significance can be appropriately managed in terms of future conservation and enhancement.

The National Infrastructure Commission could re-frame challenge 5 to focus on asset maintenance and management from a strategic perspective, to fully account for the implications of achieving resilient infrastructure and managing the legacy of historic infrastructure.

Any public body overseeing heritage assets, such as historic infrastructure, will need to adhere to the Protocol for the Care of the Government Historic Estate which has

³ <https://www.ukri.org/publications/non-domestic-buildings-best-practice-and-what-to-avoid/> and <https://journal-buildingscities.org/articles/10.5334/bc.94/> give examples.

⁴ The Welsh Government's Optimised Retrofit Programme looks set to become a useful model of this approach. See <https://gov.wales/optimised-retrofit-programme>

been developed by Historic England and the Department for Culture, Media and Sport. More information can be found [here](#). This sets out best practice for the management of heritage assets in public ownership and includes ensuring the significance of any heritage asset is considered when planning change and ensuring that the design quality of any new work enhances the historic environment.

Historic England would welcome the opportunity to discuss good practice for management of historic infrastructure.

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