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Department for Environment Food & Rural Affairs

# **Appraisal of Sustainability of the National Policy Statement for Water Resources**

Appraisal of Sustainability Report  
Appendix B



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## Report for

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Client\Reports\9. AoS of draft NPS\Appendix B

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## Document revisions

No.	Details	Date
1	Draft Appendix B	August 2018
2	Updated Appendix B	October 2018
3	Final Draft Appendix B	October 2018
4	Final Appendix B	November 2018

## Appendix B

# Detailed Appraisal Including Baseline and Contextual Information

**Appendix B** contains the collated contextual and baseline information to inform the appraisal of the draft NPS and reasonable alternatives for the following topics:

- B1: Biodiversity and Nature Conservation;
- B2: Population, Economics and Skills;
- B3: Human Health;
- B4: Land Use, Geology and Soils;
- B5: Water Quality;
- B6: Water Quantity;
- B7: Flood Risk and Coastal Change;
- B8: Air Quality;
- B9: Noise;
- B10: Climatic Factors;
- B11: Waste and Resource Management;
- B12: Traffic and Transport;
- B13: Cultural Heritage;
- B14: Landscape and Townscape.

Each topic chapter contains:

- A definition of the topic under consideration;
- A review of plans and programmes at international, UK and national (England, Scotland and Wales) scales;
- An overview of the baseline;
- A summary of the existing problems to be taken into account in carrying out the AoS;
- A description of the evolution of the baseline;
- The objectives and guide questions to be used in the appraisal of the draft NPS and reasonable alternatives to the NPS alongside definitions of significance; and
- The appraisal of the sustainability effects of the Draft NPS and Reasonable Alternatives.

For the purposes of the review of the international plans and programmes for this AoS, it is assumed that the broad objectives of extant European Union (EU) legislation will be maintained once the UK has withdrawn from the EU and that similar or equivalent environmental protections will remain in place.

## Biodiversity and Nature Conservation

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# 1. Biodiversity and Nature Conservation

## 1.1 Introduction

This section presents the overview of plans, programmes and baseline information for the Water Resources National Policy Statement (NPS) in respect of biodiversity and nature conservation.

Biodiversity in this context is defined by the **Convention on Biological Diversity**<sup>1</sup> as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.” Biodiversity is integral to the functioning of ecosystems and these, in turn, provide ‘ecosystem services’ which include food, flood management, pollination and the provision of clean air and water.

There are links between the biodiversity and nature conservation topic and other topics in the Appraisal of Sustainability (AoS), including water quality, water quantity, land use, geology and soils, climate change and landscape and townscape.

## 1.2 Review of Plans and Programmes

The review of policies, plans and programmes has identified that at the international/European level, a broad range of plans of programmes seek to protect biodiversity, including setting long-term goals to prevent the loss of biodiversity and various agreements to control the trade in endangered species several of which are of particular significance to the NPS for Water Resources.

The **Ramsar Convention** provides the framework for the conservation and wise use of wetlands and their resources and as such is of particular importance given the potential for wetlands to be affected by the NPS.

The **Water Framework Directive (WFD) (2000/60/EC)** also provides a key piece of international legislation, requiring countries to adopt an approach to water management focused on river basins. The WFD sets a general requirement for ecological protection and a general minimum chemical standard to cover all surface waters, referred to as “good ecological status” and “good chemical status”. These are key benchmarks for establishing the quality of the water environment.

At the national level, the majority of plans and programmes seek to protect all valuable habitats and species, rather than being focussed specifically on the inland water environment. The **Great Britain Invasive Non-native Species Strategy (2015)** sets aims and objectives to 2020 to address the increasing numbers of invasive species introduced in Great Britain, with around 80 non-native species established in Great Britain’s freshwater environment.

At both the national and international levels, the core objectives identified from the review of policies plans and programmes is the need to halt the decline in biodiversity, control invasive species and maintain and enhance the chemical and ecological quality of our aquatic ecosystems.

### International/European

The UK is a signatory (along with another 167 parties) to the **Convention on Biological Diversity (CBD)**, which entered into force in 1993. The main objectives of the Convention are the conservation of biological diversity and the sustainable and equitable use of biodiversity components. The CBD called for the

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<sup>1</sup> The convention uses this definition to describe ‘biological diversity’ commonly taken to mean the same as biodiversity

## Biodiversity and Nature Conservation

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development and enforcement of national strategies and associated action plans to identify, conserve and protect existing biological diversity, and to enhance it wherever possible.

In October 2010, the Convention on Biological Diversity Conference of Parties agreed the **Strategic Plan for Biodiversity 2011-2020** at Nagoya, Japan. With its five strategic goals and 20 new global 'Aichi' targets, the Plan sets a new global vision and direction for biodiversity. The new global vision is: "By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people." The parties also agreed a shorter-term ambition to "Take effective and urgent action to halt the loss of biodiversity, [so] that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet's variety of life, and contributing to human well-being, and poverty eradication".

The **Nagoya Protocol on Access and Benefit-sharing**, which entered into force in 2014, is a supplementary agreement to the Convention on Biological Diversity which sets out to establish a fair and equitable system to enable nations to co-operate in accessing and sharing the benefits of genetic resources.

The UK is also party to the **Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)**, which was ratified in the UK in 1985 and provides strict protection for endangered migratory species, and the **Bern Convention on the Conservation of European Wildlife and Natural Habitats (1982)**, which aims to ensure the conservation and protection of species and their natural habitats. In addition, the UK is party to the **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)** which came into force in 1975. The convention aims to ensure that international trade in wild animals and plants does not threaten the survival of the species in the wild.

On September 25th, 2015, countries adopted the **17 UN Sustainable Development Goals**. These include Goal 15, 'to sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss'. A range of targets are set out under each goal. Against Goal 15, there is one target of particular relevance, 'by 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements'.

The European Commission adopted the **EU Biodiversity Strategy to 2020** in 2011 to help halt the loss of biodiversity in the EU. The Strategy provides a framework for action over the next decade and covers the following key areas:

- conserving and restoring nature;
- maintaining and enhancing ecosystems and their services;
- ensuring the sustainability of agriculture, forestry and fisheries;
- combating invasive alien species; and
- addressing the global biodiversity crisis.

The strategy also sets out the following 2050 vision and 2020 headline target:

- by 2050, EU biodiversity and the ecosystem services it provides - its natural capital - are protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human wellbeing and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided; and
- halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restore them insofar as is feasible, while stepping up the EU contribution to averting global biodiversity loss.

## Biodiversity and Nature Conservation

The EU's **7th Environment Action Programme**, adopted in 2013, aims to accelerate the achievement of the strategy's objectives.

There are a number of EU Directives focusing on various types of wildlife and habitat that provide a framework for national action and international co-operation for conservation on land and in the sea. In particular, the **Habitats Directive (92/43/EEC)** and **Birds Directive (2009/147/EC)** include measures to maintain or restore important natural habitats and species including through the designation of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). These Directives are transposed into British law through a number of regulations and planning policy documents.

Under the **Ramsar Convention**, wetlands of international importance are designated as Ramsar sites. As a matter of policy, Ramsar sites in the UK are protected as European sites. The vast majority are also classified as SPAs and all terrestrial Ramsar sites in England are notified as Sites of Special Scientific Interest (SSSIs).

The **Water Framework Directive (WFD) (2000/60/EC)** established a framework for the protection of inland surface waters, transitional waters, coastal water and groundwater and was designed to improve and integrate the way water bodies are managed, including encouraging the sustainable use of water resources. The key objectives at the European level include the general protection of the aquatic ecology and providing specific protection of unique and valuable habitats. The prevention of water deterioration is also a legally binding duty on Member States under the Directive.

The **Marine Strategy Framework Directive (2008/56/EC)** requires Member States to develop a marine strategy, including determining Good Environmental Status (GES) for their marine waters, and designing and implementing programmes of measures aimed at achieving it by 2020, using an ecosystem approach to marine management. It takes account both of socio-economic factors and the cost of taking action in relation to the scale of the risk to the marine environment.

**Regulation (EU) 1143/2014** on invasive alien species entered into force on 1 January 2015, fulfilling Action 16 of Target 5 of the EU 2020 Biodiversity Strategy. It provides for a set of measures to be taken across the EU in relation to invasive alien species included on the list of Invasive Alien Species of Union concern.

## UK

The **Wildlife and Countryside Act (1981)** is the main UK legislation relating to the protection of named animal and plant species and includes legislation relating to the UK network of nationally protected wildlife areas: Sites of Special Scientific Interest (SSSIs)<sup>2</sup>. Under this Act, Natural England has responsibility for identifying and protecting the SSSIs in England. **The Countryside and Rights of Way Act 2000 (CROW Act)** strengthens the powers of Natural England to protect and manage SSSIs. The CROW Act improves the legislation for protecting and managing SSSIs so that:

- Natural England can change existing SSSIs to take account of natural changes or new information;
- all public bodies have a duty to further the conservation and enhancement of SSSIs;
- neglected or mismanaged sites can be brought into favourable management; and
- offences and heavier penalties apply to people who illegally damage SSSIs.

The **UK Biodiversity Action Plan (1994)** was the UK Government's response to signing the CBD at the 1992 Rio Earth Summit. The UK Biodiversity Action Plan was then established to conserve and enhance

<sup>2</sup> As amended by the Countryside and Rights of Way Act 2000 and the Natural Environment and Rural Communities Act 2006.



## Biodiversity and Nature Conservation

biodiversity in the UK through the use of Habitats and Species Action Plans to help the most threatened species and habitats to recover and to contribute to the conservation of global biodiversity.

Following the creation of the UK BAP, devolution in 1998 led the four countries of the UK (England, Northern Ireland, Scotland and Wales) to develop their own country strategies for biodiversity and the environment, allowing conservation approaches to differ according to the different environments and priorities within the countries. In 2007, however, a shared vision for UK biodiversity conservation was adopted by the devolved administrations and the UK government, and is described in 'Conserving Biodiversity – the UK Approach'. This document reflected the drivers for conservation action in the UK since the UK BAP was created, including the EU Gothenburg agreement in 2001 to halt the loss of biodiversity by 2010, and the findings of the Millennium Ecosystem Assessment (2005).

The **UK Post-2010 Biodiversity Framework**, published in July 2012 by the Joint Nature Conservation Committee (JNCC) and Defra, succeeds the UK BAP and 'Conserving Biodiversity – the UK Approach', and is the result of a change in strategic thinking following the publication of the CBD's 'Strategic Plan for Biodiversity 2011–2020', and the launch of the EU Biodiversity Strategy.

The purpose of this UK Post-2010 Biodiversity Framework<sup>3</sup> is to set a broad enabling structure for action across the UK between now and 2020:

- I. To set out a shared vision and priorities for UK-scale activities, in a framework jointly owned by the four countries, and to which their own strategies will contribute;
- II. To identify priority work at a UK level which will be needed to help deliver the Aichi targets and the EU Biodiversity Strategy;
- III. To facilitate the aggregation and collation of information on activity and outcomes across all countries of the UK, where the four countries agree this will bring benefits compared to individual country work; and
- IV. To streamline governance arrangements for UK-scale activity.

The Framework demonstrates how the work of the four countries and the UK contributes to achieving the Aichi Biodiversity Targets, and identifies the activities required to complement the country biodiversity strategies in achieving the targets.

The **Great Britain Invasive Non-native Species Strategy (2015)** sets aims and objectives to 2020 to address invasive species, including the prevention of invasive species arriving in Britain, early detection and monitoring, eradication and control.

The **Conservation of Habitats and Species Regulations 2017** (SI 2017/1012) (in England and Wales), the **Conservation (Natural Habitats, &c.) Regulations 1994** (in Scotland) and the **Conservation (Natural Habitats) Regulations (Northern Ireland) 1995 (as amended)** (NISR 1995/380) (in Northern Ireland) require that sites of importance to habitats or species are to be designated and any impact on such sites or species must be considered in regards to planning permission applications.

The **Environmental Protection Act (1990)** sets out key statutory requirements for the UK regarding environmental protection (including waste and nature conservation).

The Marine Strategy Framework Directive was transposed into UK law by the **Marine Strategy Regulations 2010** (SI 2010/1627) and sets out a requirement for Member States to:

- provide an assessment of the current state of their seas by July 2012;

<sup>3</sup> Joint Nature Conservancy Committee and Defra (2012) *UK Post-2010 Biodiversity Framework*. Available online at: [http://jncc.defra.gov.uk/pdf/UK\\_Post2010\\_Bio-Fwork.pdf](http://jncc.defra.gov.uk/pdf/UK_Post2010_Bio-Fwork.pdf)

## Biodiversity and Nature Conservation

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- provide a set of detailed characteristics of what GES means for their waters, and associated targets and indicators, by July 2012;
- establish a monitoring programme to measure progress by July 2014; and
- establish a programme of measures for achieving GES by 2016.

The UK has set targets for a healthy marine environment by 2020 under this Directive. The strategy to do this was published in stages: with the first part published in 2012, the second part containing monitoring programmes in 2014 and the third part setting out the programme of measures was published in 2015.

The **Marine and Coastal Access Act (2009)** sets out a number of measures including the establishment of Marine Conservation Zones (MCZs) and Marine Spatial Plans.

The **National Parks and Access to the Countryside Act (1949)** aims to conserve and protect countryside and National Parks through legislation.

### England

The **Natural Environment and Rural Communities Act 2006** established Natural England as the main body responsible for conserving, enhancing and managing England's natural environment. It also covers biodiversity, pesticides harmful to wildlife and the protection of birds.

The **Natural Environment White Paper (Defra, 2011)** recognises that nationally, the fragmentation of natural environments is driving continuing threats to biodiversity. It sets out the Government's policy intent to:

- improve the quality of the natural environment across England;
- move to a net gain in the value of nature;
- arrest the decline in habitats and species and the degradation of landscapes;
- protect priority habitats;
- safeguard vulnerable non-renewable resources for future generations;
- support natural systems to function more effectively in towns, in the country and at sea; and
- create an ecological network which is resilient to changing pressures.

By 2020, the Government seeks to achieve an overall improvement in the status of the UK's wildlife including no net loss of priority habitat and an increase of at least 200,000 hectares in the overall extent of priority habitats. Under the White Paper, the Government has also put in place a clear institutional framework to support nature restoration which includes Local Nature Partnerships creating new Nature Improvement Areas (NIAs).

**Biodiversity 2020: A strategy for England's wildlife and ecosystem services (Defra, 2011)** builds on the Natural Environment White Paper and provides a comprehensive picture of how the Government is implementing international and EU commitments. It sets out the strategic direction for biodiversity policy for the next decade on land (including rivers and lakes) and at sea. The Strategy has as its mission to halt overall biodiversity loss, support healthy, well-functioning ecosystems, and establish coherent ecological networks, with more and better places for nature for the benefit of wildlife and people.

The **National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government (MHCLG), 2018)** includes key policies to ensure the planning system contributes to and enhances the natural and local environment by:



## Biodiversity and Nature Conservation

- protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils;
- recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services; –;
- maintaining the character of the undeveloped coast, while improving public access to it where appropriate;
- minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

The NPPF states that, when preparing plans to meet development needs, the aim should be to minimise pollution and other adverse effects on the local and natural environment. Local planning authorities are expected to set criteria based policies against which proposals for any development on or affecting protected wildlife or geodiversity or landscape areas will be judged. In doing so, they must take into account the policies in the NPPF including those which set out the circumstances where in order to conserve and enhance biodiversity planning permission should be refused.

**Planning Practice Guidance for the Natural Environment (2016)** explains key issues in implementing policy to protect biodiversity, including local requirements.

**A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)** includes a range of policies and associated actions to protect and recover biodiversity including (inter alia) commitments to publishing a strategy for nature, develop a Nature Recovery Network, provide opportunities for the reintroduction of native species and improve biosecurity to protect and conserve nature. The Plan also seeks, through a range of actions, to embed an ‘environmental net gain’ principle for development including new infrastructure.

## Scotland

The **National Planning Framework 3 (2014)**, as part of its spatial strategy, envisions Scotland as “a natural and resilient place” and identifies where there will be opportunities for environmental enhancement.

The **Nature Conservation (Scotland) Act 2004** places duties on public bodies in relation to the conservation of biodiversity, increases protection for SSSI, amends legislation on Nature Conservation Orders, provides for Land Management Orders for SSSIs and associated land, strengthens wildlife enforcement legislation, and requires the preparation of a Scottish Fossil Code.

**Scottish Planning Policy (SPP) (2014)** sets out the Scottish Government’s policy on land use planning. It incorporates the conservation of designated or protected sites and species, takes into account ecosystems and natural processes and seeks to establish integrated habitat networks.

**Planning Advice Note 60 (PAN 60): Planning for Natural Heritage (2000)** provides advice on how development and the planning system can contribute to the conservation, enhancement, enjoyment and understanding of Scotland’s natural environment and encourages developers and planning authorities to be positive and creative in addressing natural heritage issues.

## Biodiversity and Nature Conservation

**Scotland's Biodiversity: It's in Your Hands - A strategy for the conservation and enhancement of biodiversity in Scotland (2004)** aims to conserve biodiversity for the health, enjoyment and wellbeing of the people of Scotland now and in the future and provides a 25 year framework in order to achieve this goal.

**Scotland's performance against 2010 international targets** showed that good progress had been made towards meeting the UN target of a significant reduction in the loss of biodiversity. Lessons learnt from the 2010 assessment included the need to adopt a more adaptive approach, learning from experience and trying to tackle the causes of biodiversity loss. The **2020 Challenge for Scotland's Biodiversity (2013)** is a supplement to Scotland's Biodiversity: It's in Your Hands, and together, the two documents comprise the **Scottish Biodiversity Strategy**. The 2020 Challenge focusses on desired outcomes for 2020, responds to the new international Aichi targets and updates elements of the 2004 strategy.

**Scotland's Biodiversity - a Route Map to 2020 (2015)** sets out the short-term priority work needed to deliver the 2020 Challenge and meet the international Aichi Targets for biodiversity. Progress against the 2020 challenge for biodiversity was most recently presented to the Scottish Parliament in the **Scottish Biodiversity Strategy: Report to the Scottish Parliament 2014 – 2016**<sup>4</sup>.

The first land use strategy for Scotland (**Getting the best from our land - A land use strategy for Scotland (2011)**) had the objectives of: land-based businesses working with nature; responsible stewardship of Scotland's natural resources; and urban and rural communities better connected to the land. The vision, objectives and principles of the strategy were retained and built upon by the second land use strategy (published 2016) which covers the period 2016 – 2021.

## Wales

**Planning Policy Wales (Edition 8) (2016)** sets out the land use planning policies of the Welsh Government, including objectives for the conservation and improvement of landscape and biodiversity.

**Technical Advice Note 5 (TAN5): Nature Conservation and Planning (2009)** sets out how the planning system should contribute to protecting and enhancing biodiversity and geological conservation.

The **Environment Strategy for Wales** was published in May 2006. It set out proposed outcomes for what the Welsh Government sought to achieve by 2026, and the actions required. The **One Wales: One Planet (2009)** sustainable development scheme also supports the strategy's outcomes and includes biodiversity indicators.

The **Well-being of Future Generations (Wales) Act 2015** sets out a framework to improve the social, economic, environmental and cultural well-being of Wales. It requires public bodies in Wales to contribute to sustainable development and in particular to implement actions that contribute to well-being goals established under the Act. One goal, "a resilient Wales" refers explicitly to biodiversity, "A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change)".

The **Environment (Wales) Act 2016** sets a more joined up legislative framework for regulating Wales' environment and provides for the sustainable management of natural resources. It required Welsh Ministers to adopt a **Natural Resources Policy** (NRP) and this was done in August 2017. The focus of the NRP is the sustainable management of Wales' natural resources to maximise their contribution to achieving goals within the Well-being of Future Generations Act 2015. The policy sets out three National Priorities. These are: delivering nature-based solutions; increasing renewable energy and resource efficiency; and taking a place-based approach. The NRP links to the Wales National Marine Plan as the means of sustainably managing marine resources, reflecting the context of the ecosystem approach for Wales' marine area. The Environment (Wales) Act 2016 also requires Natural Resources Wales to publish a **State of Natural Resources Report**

<sup>4</sup> Scottish Government (2017) *Scottish Biodiversity Strategy: Report to the Scottish Parliament 2014 – 2016*. Available online at: <http://www.gov.scot/Resource/0052/00522533.pdf>

## Biodiversity and Nature Conservation

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(SoNaRR) which will set out evidence on Wales' progress towards its environment and natural resource management goals. The Act also establishes a duty on public authorities to "maintain and enhance biodiversity in the exercise of functions in relation to Wales, and in so doing promote the resilience of ecosystems".

### 1.3 Overview of the Baseline

Good quality habitats are those which, for a given habitat type, have a larger range of features. For example, a habitat that has varying topography, water distribution or appropriate grazing by animals. This provides a broader variety of conditions and resources that a greater number and diversity of species can exploit. A good quality habitat needs to be large enough to support populations of species over a long period of time. Additionally, some species require large areas of consistent habitat, whilst others thrive in mosaics and therefore the best sites need to be of a size that allows both species to be accommodated.

A mixture or mosaic of habitats provide areas for a variety of species that require different conditions and resources to survive. Having multiple habitats in a locality provides opportunity for a higher number of species to utilize and occupy the area. Therefore, biodiversity is generally higher.

Habitat and habitat quality are therefore commonly used as indicators of biodiversity as good quality, diverse habitats with consistent resources and conditions generally allow for a greater diversity of species to survive and reproduce.

Given the national scope of the NPS, the baseline data presented in this section takes a comprehensive look at the overall national baseline for biodiversity. The relationship between the baseline environment and the potential effects of the plan will become increasingly clear as the appraisal progresses. Inevitably this means that in some instances the link between the baseline environment discussed here and the NPS are not directly clear; however the baseline environmental information is included to ensure that the appraisal is based on a comprehensive dataset from the outset.

#### UK

Special Areas of Conservation (SACs), Sites of Community Importance (SCIs), Special Protection Areas (SPAs) and Ramsar sites are important for biodiversity at the international level. In the UK there are 651 SACs/SCIs, 272 SPAs and 149 Ramsar sites<sup>5</sup>.

**Figures 1.1, 1.2 and 1.3** illustrate the distribution of European designed sites in England, Scotland and Wales. In addition, there are almost 7,000 nationally designated sites in the UK, known as SSSIs in England, Wales and Scotland, and Areas of Special Scientific Interest (ASSIs) in Northern Ireland. There are currently 99 SACs with marine component, covering 7.6% of UK waters. 83 of these SACs are completely in inshore waters. There currently are 13 marine habitats and eight marine species in UK waters which are protected under Annexes I and II of the Habitats Directive<sup>6</sup>.

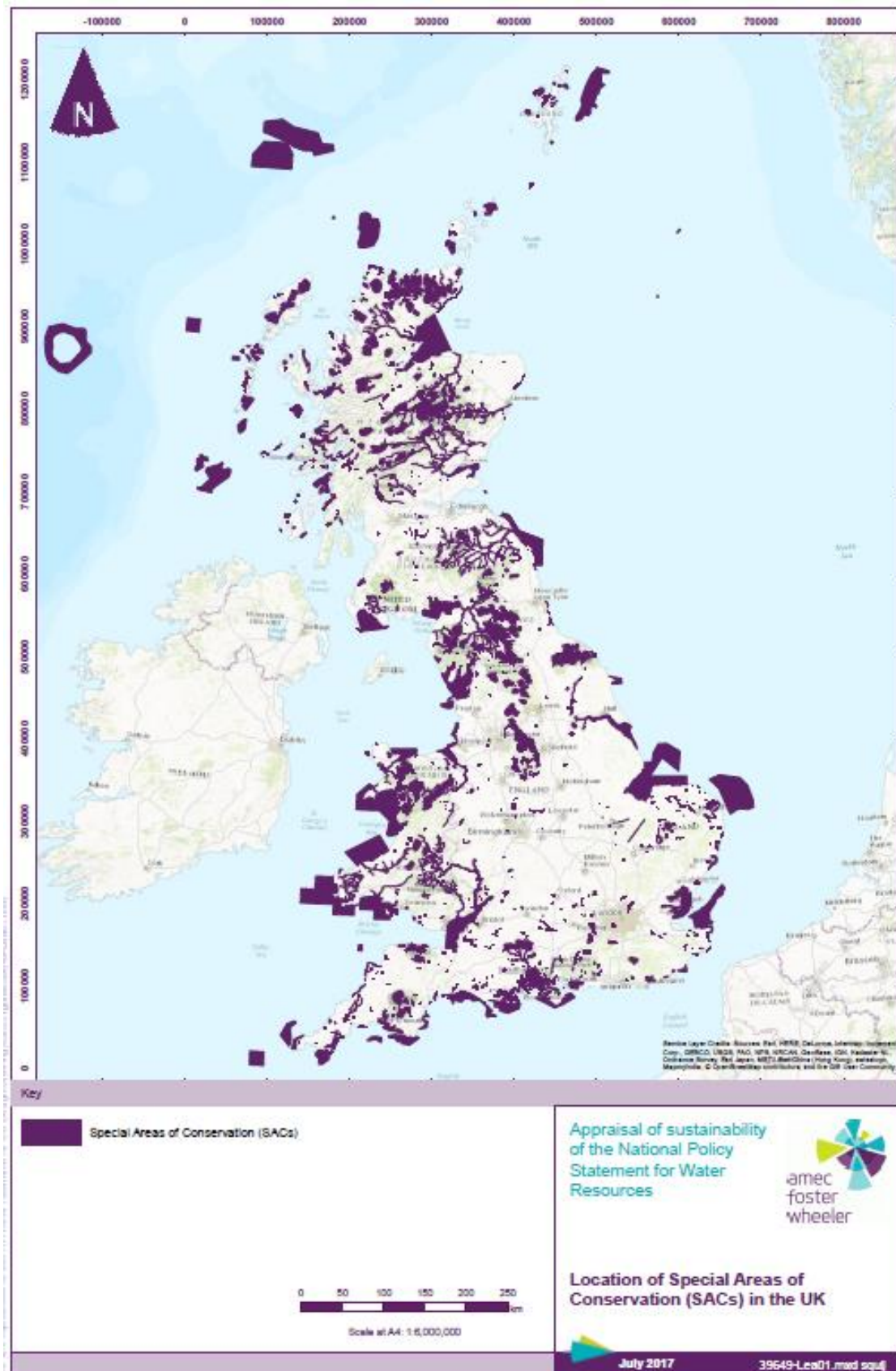
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<sup>5</sup> Joint Nature Conservation Committee (2017) *UK Protected Sites*. Available online at: <http://jncc.defra.gov.uk/page-4>

<sup>6</sup> Joint Nature Conservation Committee (2017) *SACs with Marine Components*. Available online at: <http://jncc.defra.gov.uk/page-1445>

## Biodiversity and Nature Conservation

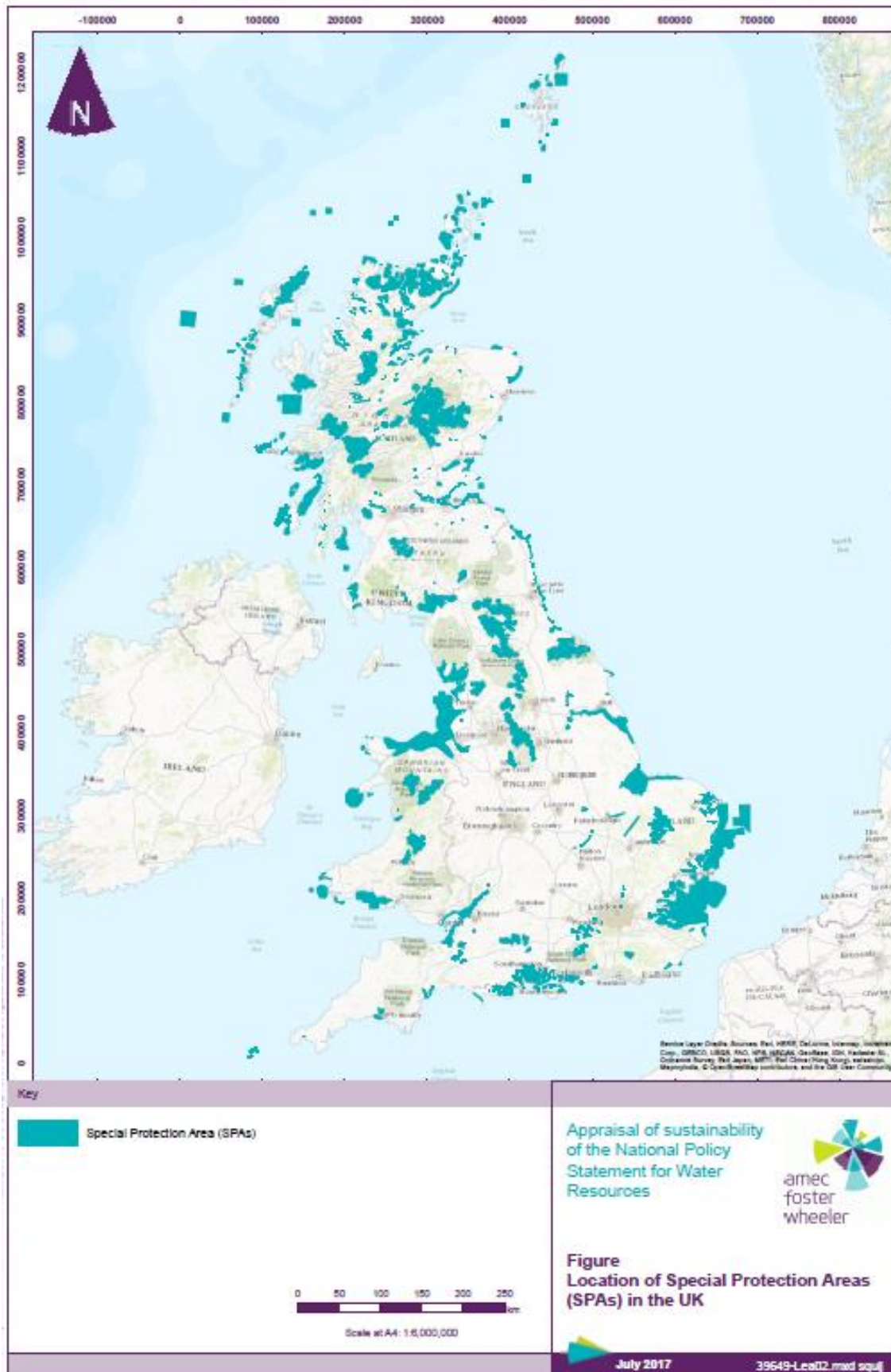
Figure 1.1 Location of Special Areas of Conservation (SACs) in the UK





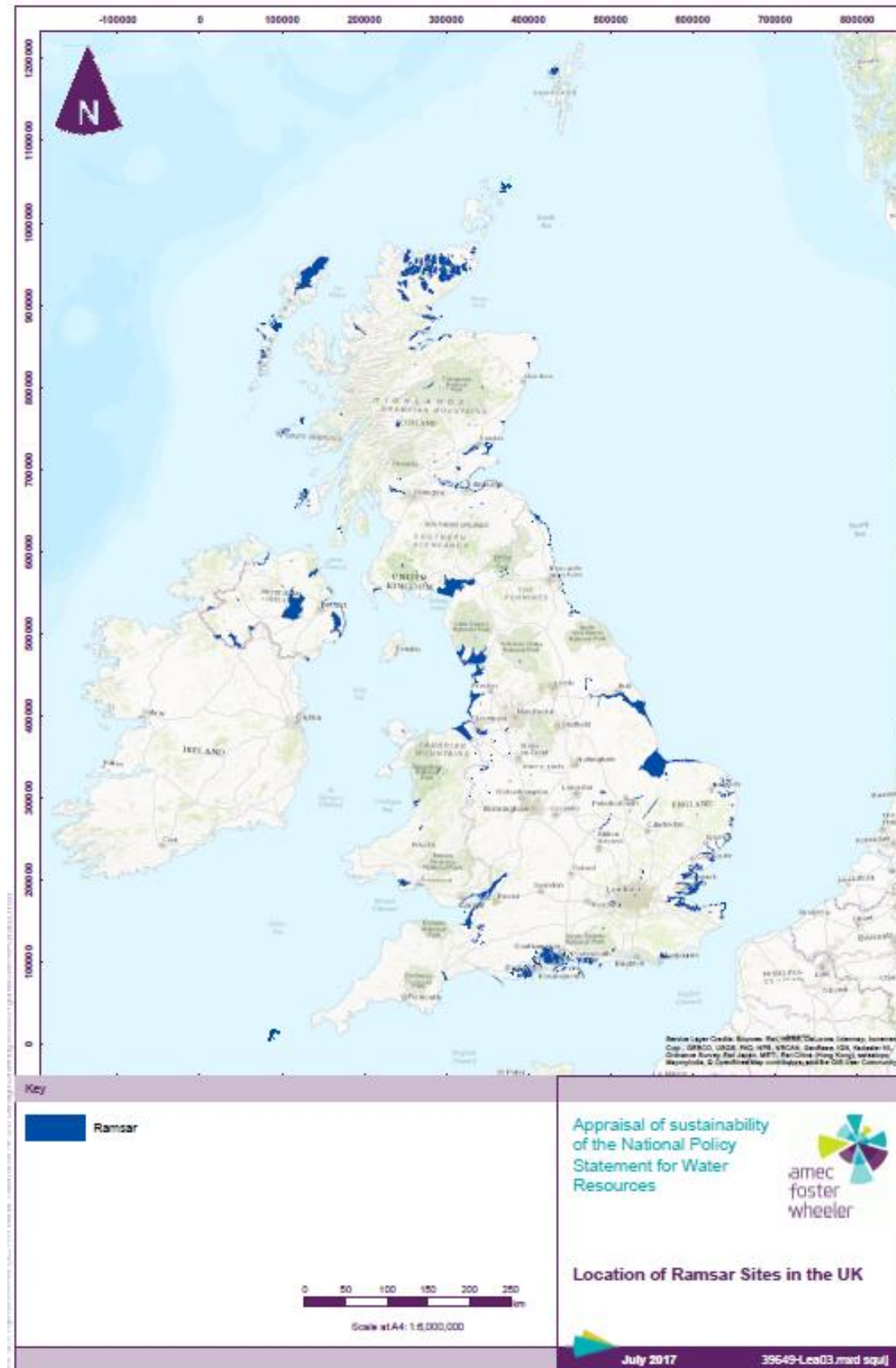
## Biodiversity and Nature Conservation

Figure 1.2 Location of Special Protection Areas (SPAs) in the UK



## Biodiversity and Nature Conservation

Figure 1.3 Location of Ramsar Sites in the UK



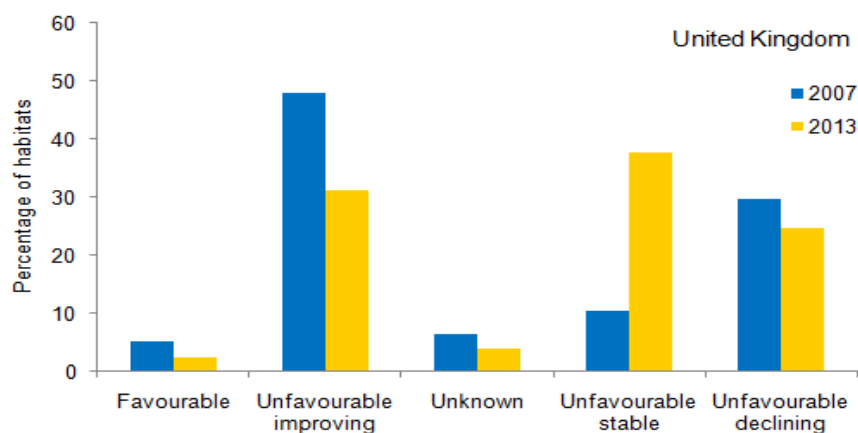


## Biodiversity and Nature Conservation

### Conservation Status of UK Habitats Listed under the Habitats Directive

In 2007 and again in 2013, the Joint Nature Conservation Committee (JNCC)<sup>7</sup> published reports identifying the change in status of UK habitats of European importance. The 2007 Report identified that 5% of UK habitats listed in Annex I of the Habitats Directive were in favourable conservation status, with that number declining to 3% in the 2013 report. The conservation status of 48% of habitats was improving in 2007, while in 2013, 31% were found to be improving. The conservation status of 30% of the habitats was declining in 2007, whereas in 2013 only 25% were declining (see **Figure 1.4**).

Figure 1.4 Percentage of UK habitats of European importance in improving or declining conservation status in 2007 and 2013.



**Source:** UK Habitats Directive (Article 17) reports: 2<sup>nd</sup> UK Report on Implementation of the Habitats Directive (2007) and 3<sup>rd</sup> UK Habitats Directive Reporting (2013).

**Notes:** Graph based on 77 habitats listed on Annex I of the Habitats Directive.

The aim of the Habitats Directive is to achieve favourable conservation status for the species and habitats listed in its Annexes. An assessment of status and trends for each species and habitat is undertaken every six years. Trends in unfavourable conservation status allow identification of whether progress is being made, as it will take many years for some habitats and species to reach favourable conservation status.

Relating specifically to the condition of freshwater habitats in the UK, **Table 1.1** identifies the favourability status of SSSIs / ASSIs<sup>8</sup>.

<sup>7</sup> UK Habitats Directive (Article 17) reports: 2<sup>nd</sup> UK Report on Implementation of the Habitats Directive (2007) and 3<sup>rd</sup> UK Habitats Directive Reporting (2013)

<sup>8</sup> Joint Nature Conservation Committee (2016) *Condition of UK Freshwater Habitats*. Available online at: <http://jncc.defra.gov.uk/page-6695>

## Biodiversity and Nature Conservation

Table 1.1 SSSI / ASSIs status of UK Freshwater Habitats

	Favourable	Unfavourable recovering	Unfavourable not recovering (declining or no change)	Destroyed or part destroyed
<b>Standing water</b>	49%	12%	38%	1%
<b>Rivers</b>	32%	11%	56%	1%

The favourability status of freshwater SACs is set out in **Table 1.2**.

Table 1.2 SAC Status of Freshwater SACs

	Favourable	Unfavourable recovering	Unfavourable not recovering (declining or no change)	Destroyed or part destroyed
<b>Standing water</b>	49%	12%	38%	1%
<b>Rivers</b>	32%	11%	56%	1%

Further detail on the status of SACs into EU Habitats Directive Annex 1 types is provided in **Table 1.3**.

Table 1.3 SAC Status by Annex 1 habitat types

Annex I habitat type	Favourable	Unfavourable recovering	Unfavourable not recovering
<b>H3170 Mediterranean temporary ponds</b>	100%	0%	0%
<b>H3160 Natural dystrophic lakes and ponds</b>	99%	<1%	1%
<b>H3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea</b>	80%	6%	14%
<b>H3150 Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation</b>	61%	9%	30%
<b>H3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. dunes along the shoreline with Ammophila arenaria ('white dunes')</b>	38%	4%	58%
<b>H3110 Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)</b>	22%	78%	0%
<b>H3260 Water courses of plain to montane levels with the Ranunculion fluitantis and Callitriche-Batrachion vegetation</b>	3%	0%	97%
<b>H3180 Turloughs</b>	0%	0%	100%

## Biodiversity and Nature Conservation

UK freshwater habitats and their associated species are threatened by a range of factors. **Table 1.4** provides a summary of the major threats. These are based on information in the 3rd UK Report on Implementation of the Habitats Directive and the UK Biodiversity Habitat Action Plans<sup>9</sup>.

Table 1.4 Threats to UK Freshwater Habitats

	Eutrophic standing waters	Mesotrophic lakes	Oligotrophic and dystrophic lakes	Aquifer-fed naturally fluctuating water bodies	Ponds	Rivers
<b>Pollution</b>	✓	✓	✓	✓	✓	✓
<b>Abstraction and flow regime</b>	✓	✓	✓	✓	✓	✓
<b>Invasive alien species</b>	✓	✓	✓		✓	✓
<b>Recreation</b>	✓	✓	✓			
<b>Fisheries management</b>	✓	✓		✓	✓	
<b>Climate change</b>	✓			✓		✓
<b>Grazing/control of scrub &amp; trees</b>				✓	✓	
<b>Morphological alterations</b>					✓	✓

### Reviews of the UK SPA network

The JNCC have undertaken three reviews of the UK SPA network. The first was published in 1989 (by the then Nature Conservancy Council), the second in 2001 and the most recent in 2016. The 2016 review identifies that whilst total numbers of breeding seabirds / waterbirds and of non-breeding waterbirds have increased, total numbers of breeding birds of prey have declined. This reflects major declines in Merlin and Peregrine within SPAs. Numbers of other raptors have either been stable or increased. It also identifies that overall the current SPA network appears to be relatively resilient to projected climate change. However, the spatial distribution, abundance and composition of species in the network will probably be different in the future, reinforcing the need for roughly decadal reviews of the UK SPA network. Advice to Government includes a recommendation that a separate assessment and review of SPA provision in both the inshore and offshore marine environment should be considered for at least 49 species<sup>10</sup>.

### Bird Populations

Bird populations are considered to be good indicators of the state of the environment and the countryside. Species typical of farmland, woodland and coastal areas have been used as indicators of the health of their

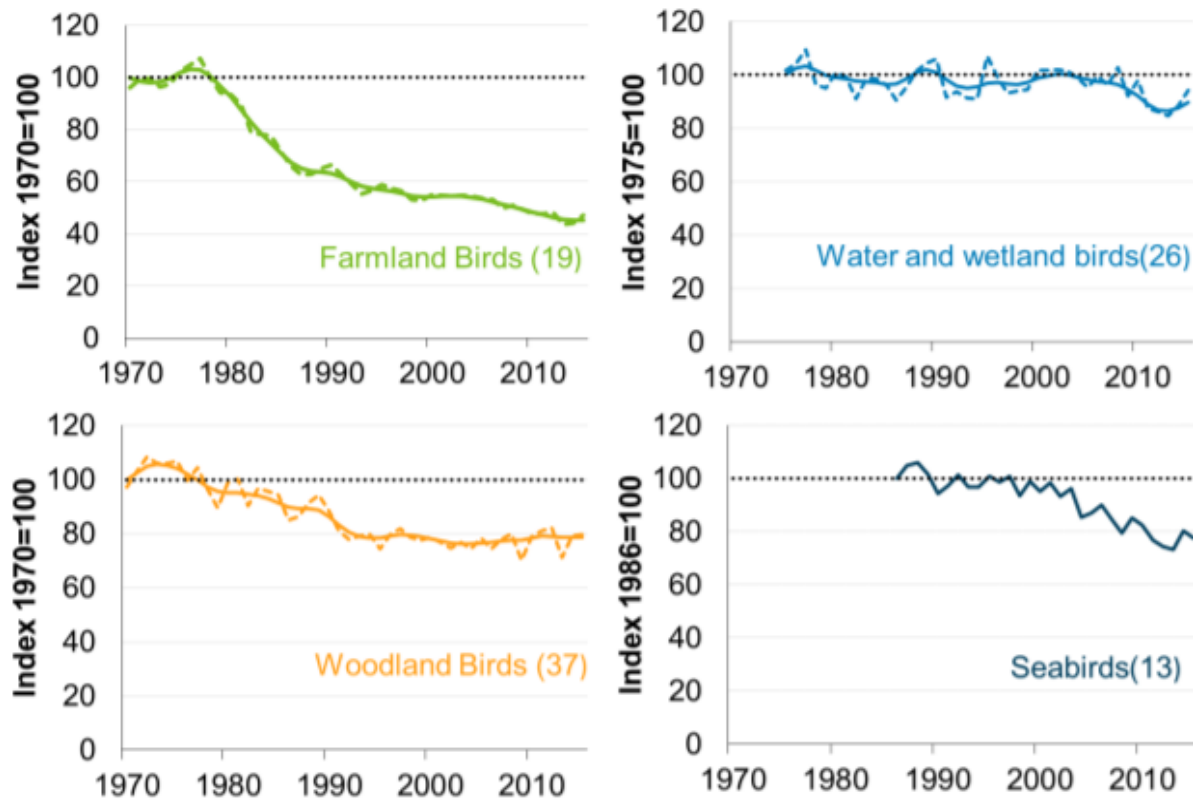
<sup>9</sup> Joint Nature Conservation Committee (2016) *Threats to UK Freshwater Habitats*. Available online at: <http://jncc.defra.gov.uk/page-6694>

<sup>10</sup> Joint Nature Conservation Committee (2016) *The status of UK SPAs in the 2000s: the third network review*. Available online at: [http://jncc.defra.gov.uk/pdf/UKSPA3\\_StatusofUKSPAinthe2000s.pdf](http://jncc.defra.gov.uk/pdf/UKSPA3_StatusofUKSPAinthe2000s.pdf)

## Biodiversity and Nature Conservation

particular habitat (see **Figure 1.5**, **Figure 1.6** and **Figure 1.7**) which provide an overview of population changes since 1970)<sup>11</sup>. The species used to calculate the indicators are set out in **Annex A**.

Figure 1.5 Populations of wild birds in the UK, by habitat, 1970-2015<sup>12</sup>



**Source:** RSPB, BTO, JNCC, Defra.

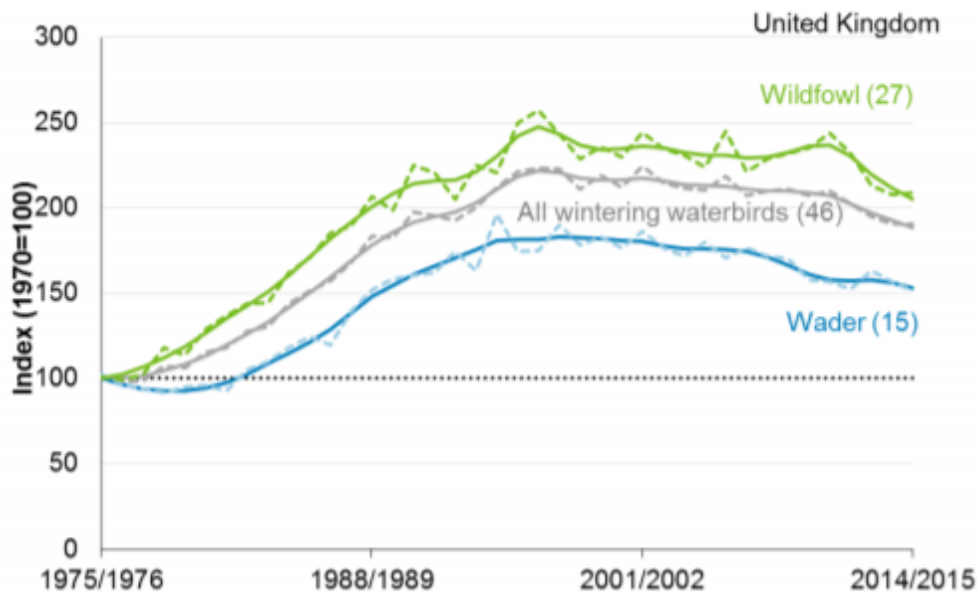
**Note:** Figures in brackets show the number of species. Graph shows unsmoothed trends (dashed lines) and smoothed trends (solid lines). No smoothed trend is available for seabirds as individual species population trends are based on full counts at colonies or wetland and coastal sites.

<sup>11</sup> Defra (2017) *Wild Bird Populations in the UK, 1970-2015*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/614737/UK\\_Wild\\_birds\\_1970\\_2015\\_2.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/614737/UK_Wild_birds_1970_2015_2.pdf)

<sup>12</sup> Defra (2017) *Wild Bird Populations in the UK, 1970-2015*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/614737/UK\\_Wild\\_birds\\_1970\\_2015\\_2.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/614737/UK_Wild_birds_1970_2015_2.pdf)

## Biodiversity and Nature Conservation

Figure 1.6 Populations of wintering waterbirds in the UK, 1975-76 to 2014-15<sup>13</sup>



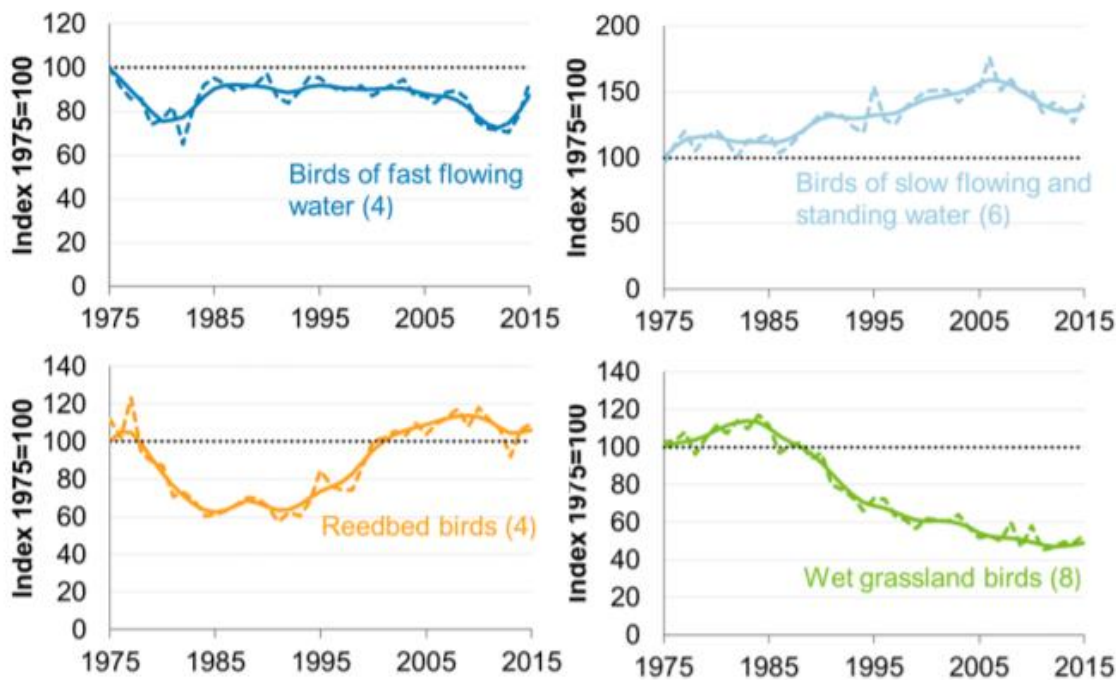
Source: RSPB, BTO, JNCC, Defra.

**Note:** Figures in brackets show the number of species. Graph shows unsmoothed trend (dashed line) and smoothed trend (solid line). Data from surveys of wintering waterbirds are based on full counts at colonies or wetland and coastal sites of markedly varying size. This means that bootstrapping methods cannot be applied and that trends for these groups are currently presented without confidence intervals.

<sup>13</sup> Defra (2017) *Wild Bird Populations in the UK, 1970-2015*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/614737/UK\\_Wild\\_birds\\_1970\\_2015\\_2.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/614737/UK_Wild_birds_1970_2015_2.pdf)

## Biodiversity and Nature Conservation

Figure 1.7 Populations of water and wetland birds in the UK, 1975 - 2015<sup>14</sup>



Source: RSPB, BTO, JNCC, Defra.

**Note:** Figures in brackets show the number of species. Graph shows unsmoothed trend (dashed line) and smoothed trend (solid line). The number of species in each of the sub indicators do not sum to the all species indicator because four species in the main breeding wetland and waterways indicator are not included in any of the sub-indicators covering birds of reed beds, fast flowing waterways, standing and slow-flowing waterways, or wet grasslands. These are Sand Martin, Kingfisher, Grey Heron and Oystercatcher. None of these species show a strong preference for any one of those habitats, either being fairly generalist or with large proportions of their populations in other habitats such as coasts (Oystercatcher).

In 2015, the all-species index in the UK was 2% below its 1970 level, although trends vary substantially between different species and habitats. The smoothed index remained level between 2009 and 2014.

Since 1970, populations of breeding farmland birds have declined by over half, with much of this decline taking place between the late seventies and early eighties. Some of the main causes of this decline relate to land management changes and the intensification of farming, a move from spring to autumn sowing of arable crops, change in grassland management, increased pesticide and fertiliser use, and the removal of non-cropped features such as hedgerows. There is also evidence of adverse impacts from disease.

The breeding woodland bird populations have declined by 18% since 1970, with the greatest decline occurring across a 10 year period from the early eighties. The key causes of this are a lack of woodland management and increased deer browsing, which reduces the availability of nesting and foraging habitats. Long-distance migrant woodland birds may also suffer from deterioration of habitats outside the UK.

The breeding water and wetland birds experienced an overall decline of 7% from 1975 to 2015, although between the 26 species there is significant variation. Certain groups with this, such as breeding waders, have experienced historical declines due to changes in land management, intensification of grassland

<sup>14</sup> Defra (2017) *Wild Bird Populations in the UK, 1970-2015*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/614737/UK\\_Wild\\_birds\\_1970\\_2015\\_2.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/614737/UK_Wild_birds_1970_2015_2.pdf)



## Biodiversity and Nature Conservation

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management and the conversion of coastal and floodplain grazing marshes to arable land. Fragmented populations are also vulnerable to predation.

Populations of breeding seabirds have also declined by 22% from 1986 to 2015, with the number of seabirds declining by 6% between 2009 and 2014 alone. In 2013 numbers dipped to the lowest ever but have since increased slightly.

Wintering waterbirds are one of the few populations to show a substantial increase, with populations almost double 1975-76 levels (increase of 92%). This peaked in the late 1990s and has since had a minor decline. These species are affected by conditions in the countries where they breed, the condition and amount of coastal and wetland habitat in the UK and changes in migratory patterns.

Overall, birds in the UK are showing changes in abundance and distribution, predominantly moving northwards in a way that is consistent with a changing climate<sup>15</sup>.

### Bat Populations

Bat species make up a third of the UK's mammal fauna and occur in most lowland habitats across the UK. Bats are widespread throughout a variety of landscapes including urban areas, farmland, woodland, and river/lake systems. To thrive they require adequate roosting opportunities (particularly for breeding and hibernating), foraging habitat and connected landscape features, such as hedgerows and tree lines that assist them in commuting between roost sites and feeding locations. Key pressures on bats (landscape change, agricultural intensification, development, habitat fragmentation) are also relevant to many other wildlife groups. Bats are sensitive to pollution and factors affecting their insect prey (e.g. pesticides, drainage and land management change). Climatic shifts are predicted to affect bat populations through changes in their yearly hibernation cycles, breeding success and food availability.

Bats have undergone severe declines historically. However, between 1999 and 2013, bat populations have increased significantly by 23% (see **Figure 1.8**)<sup>16</sup>. An assessment by the Bat Conservation Trust of the underlying smoothed trend shows this to be a statistically significant increase. In the short term, between 2008 and 2013, bat populations have shown a small, non-significant decrease of 2.5% and are therefore considered to be stable.

Three species have increased in the long term, and no species have decreased. In the short term, between 2008 and 2013, one species has shown a significant decrease, two have shown significant increases, and five of the eight species have shown no significant change in population size.

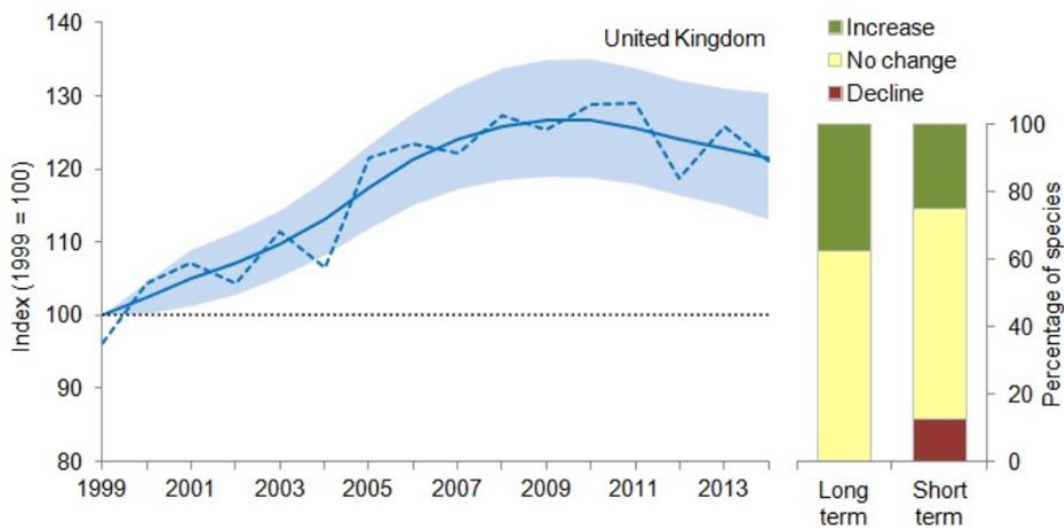
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<sup>15</sup> British Trust for Ornithology (2017) *The state of the UK's birds 2017*. Available online at: <https://www.bto.org/research-data-services/publications/state-uk-birds/2017/state-uk-birds-2017>

<sup>16</sup> Joint Nature Conservation Committee (2016) *Mammals of the wide countryside (bats)*. Available online at: <http://jncc.defra.gov.uk/page-4271>

## Biodiversity and Nature Conservation

Figure 1.8 Trends in Bat Populations, 1999-2014



**Source:** Bat Conservation Trust.

**Notes:**

- The headline measure is a composite index of eight species: serotine, Daubenton's bat, Natterer's bat, noctule, common pipistrelle, soprano pipistrelle, brown long-eared bat, and lesser horseshoe bat.
- Graph shows unsmoothed trend (dashed line) and smoothed trend (solid line) with its 95% confidence interval (shaded).
- The bar chart shows the percentage of species which, over the time period of the short-term or long-term assessment respectively, have shown a statistically significant increase or decrease.

### Butterfly Populations

Butterflies respond rapidly to changes in environmental conditions and habitat management, occur in a wide range of habitats, and are representative of many other insects. Butterflies are complementary to birds and bats as an indicator because they use resources in the landscape at a much finer spatial scale than either of these groups.

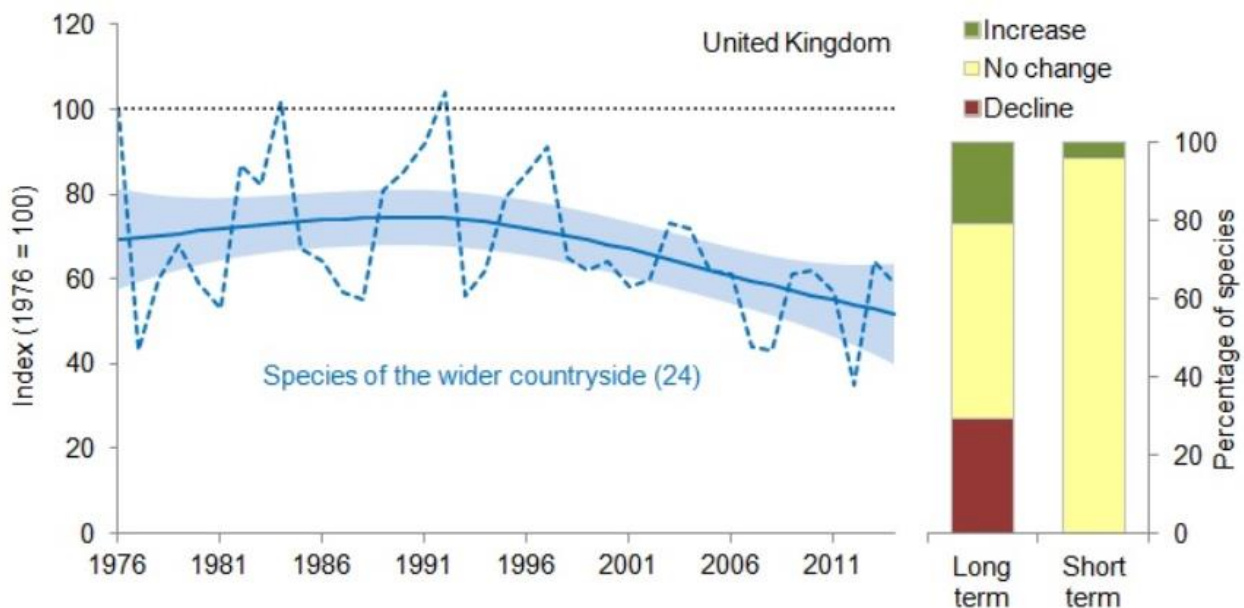
Trends are monitored in annual populations of specialist butterfly populations (those strongly associated with particular habitats, such as unimproved grassland) and generalist butterflies of the wider countryside. The data shows a high degree of annual variation<sup>17,18</sup>. The assessment of change is therefore made on an analysis of the underlying trends undertaken by Butterfly Conservation and the Centre for Ecology & Hydrology. **Figure 1.9** presents monitored trends since 1976.

<sup>17</sup> Joint Nature Conservation Committee (2016) *Insects of the wide countryside (butterflies)*. Available online at: <http://www.jncc.gov.uk/page-4236>

<sup>18</sup> Dennis, E.B., Freeman, S.N., Brereton, T. & Roy, D.B. 2013. *Indexing butterfly abundance whilst accounting for missing counts and variability in seasonal pattern*. *Methods in Ecology and Evolution*, 4(7), 637–645

## Biodiversity and Nature Conservation

Figure 1.9 Trends in Butterfly Populations in the UK: species of the wider countryside, 1976-2014



Source: Butterfly Conservation, Centre for Ecology & Hydrology, Defra, JNCC.

### Notes:

- Figure in brackets shows the number of species included in the index.
- Line graph shows unsmoothed trend (dashed line) and smoothed trend (solid line) with its 95 per cent confidence interval (shaded).
- Bar chart shows the percentage of species within the indicator that have shown a statistically significant increase, statistically significant decrease or no change.
- Since 2013 an improved analysis method was applied to the measure for species of the wider countryside.

Large fluctuations in numbers between years are typical features of butterfly populations and is often linked to weather conditions. Since 1976, the indices for butterflies associated strongly with semi-natural habitats (specialists) and for those found in the wider countryside show declines of 61% and 41% respectively. The unsmoothed data for habitat specialist butterflies shows a short-term increase between 2009 and 2014, while wider countryside species declined over this period. However, the underlying analysis of the smoothed trend shows that these changes are not significant.

In the most recent year (2014), habitat specialist butterflies increased by 7% from the previous year, whilst wider countryside species decreased by 8%.

Data from the GB Non-Native Species Report Card 2014<sup>19</sup> identifies the following key data:

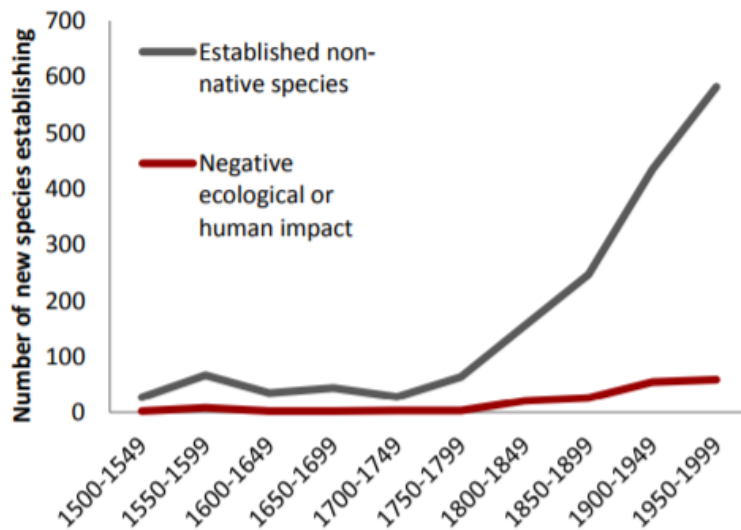
- more than 3,017 non-native species;
- 1,919 established (self-sustaining populations) non-native species comprising 1,494 established non-native plants and 420 established non-native animals and 5 other species;
- A total of 7 non-native species are known to have been eradicated from GB; and
- 234 established non-native species have been designated as having a negative ecological or human impact: 136 established non-native animals, 96 established non-native plants and 2 other species.

<sup>19</sup> Defra, The Scottish Government and The Welsh Government (2014) *GB Non-Native Species Report Card 2014*. Available online at: <http://www.nonnativespecies.org/factsheet/index.cfm>

## Biodiversity and Nature Conservation

The dominant pathways for non-native species in freshwater environments are both ornamental (41 species) and aquaculture (23 species). In the marine environment the arrival pathway for many non-native species is unknown but stowaways (53 species) and aquaculture (33 species) are both dominant pathways. The overall number of new species becoming established is shown in **Figure 1.10**.

Figure 1.10 Establishment of the species within the GB Non-native Species Portal



## England

As of August 2017, there are approximately 4,700 sites designated for nature conservation in England, covering approximately 3.9 million hectares of land<sup>20</sup>. The designations and corresponding areas are shown in **Table 1.5**.

Table 1.5 Nature conservation designation and area

Designation	No. of Sites	Total Area (ha)
<b>Ramsar</b>	72	396,175
<b>SAC</b>	245	1,017,227
<b>SPA</b>	85	1,299,067
<b>NNR</b>	225	93,616
<b>SSI</b>	4,126	1,093,646

<sup>20</sup> Natural England (2017) *Designated Sites View database*. Available online at: <https://designatedsites.naturalengland.org.uk/SearchEngland.aspx>

## Biodiversity and Nature Conservation

The condition status of the various designations is set out in **Table 1.6**<sup>21, 22, 23, 24, 25</sup>.

Table 1.6 Condition status of Sites Designated for Nature Conservation

	Favourable	Unfavourable recovering	Unfavourable - No change	Unfavourable declining	Partially destroyed	Destroyed	Not Assessed
<b>Ramsar</b>	58.09	36.39	2.93	2.57	0.01	0	0
<b>SAC</b>	35.06	60.8	2.82	1.15	0.03	0	0.14
<b>SPA</b>	38.28	57.56	2.31	1.78	0.04	0	0.03
<b>NNR</b>	53.35	39.15	5.07	1.9	0	0	0.53
<b>SSSI</b>	38.51	55.8	3.39	2.08	0.03	0.02	0.18

The condition status data in **Table 1.6** is shown graphically **Figure 1.11**.

<sup>21</sup> Natural England (2017) *Designated Sites View database*. Available online at:  
<https://designatedsites.naturalengland.org.uk/ReportConditionSummary.aspx?SiteType=SAC>

<sup>22</sup> Natural England (2017) *Designated Sites View database*. Available online at:  
<https://designatedsites.naturalengland.org.uk/ReportConditionSummary.aspx?SiteType=SPA>

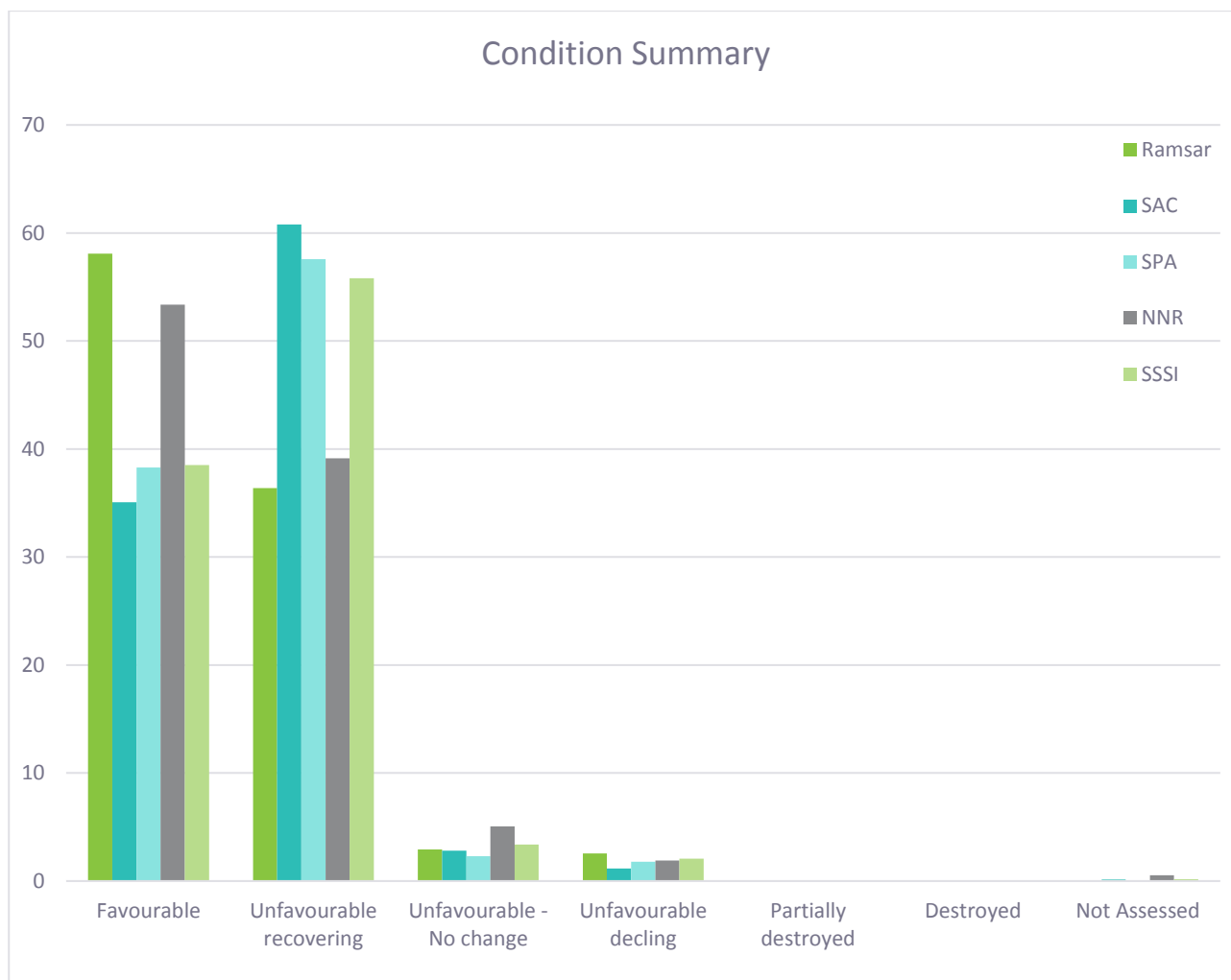
<sup>23</sup> Natural England (2017) *Designated Sites View database*. Available online at:  
<https://designatedsites.naturalengland.org.uk/ReportConditionSummary.aspx?SiteType=RAMSAR>

<sup>24</sup> Natural England (2017) *Designated Sites View database*. Available online at:  
<https://designatedsites.naturalengland.org.uk/ReportConditionSummary.aspx?SiteType=ALL>

<sup>25</sup> Natural England (2017) *Designated Sites View database*. Available online at:  
<https://designatedsites.naturalengland.org.uk/ReportConditionSummary.aspx?SiteType=NNR>

## Biodiversity and Nature Conservation

Figure 1.11 Condition status of Sites Designated for Nature Conservation



The reasons for adverse conditions at SSSI sites are set out in **Table 1.7**. This indicates that planning permission (general) was linked to 0.37% of the area not meeting the Public Service Agreement (PSA) Target for SSSIs<sup>26</sup>.

Table 1.7 Reasons for Adverse Condition Summary

Adverse Condition Reason	Num Units	Area of Units (ha)	% of unit area not meeting the PSA target
<b>Other (the adverse condition reason doesn't fall into one of the categories below)</b>	381	10,319.90	13.32%
<b>Agriculture - Overgrazing</b>	207	9,376.50	12.10%

<sup>26</sup> All Public Service Agreement targets were abolished in 2010. The PSA target was for 95% of SSSIs to be in either 'favourable' or 'unfavourable recovering' condition by 2010.



## Biodiversity and Nature Conservation

Adverse Condition Reason	Num Units	Area of Units (ha)	% of unit area not meeting the PSA target
Freshwater Pollution - Water Pollution - Agriculture/Run Off	271	5,756.09	7.43%
Agriculture - Undergrazing	417	4,954.41	6.39%
Freshwater - Inappropriate Water Levels	180	4,672.30	6.03%
Lack of Corrective Works - Inappropriate Scrub Control	466	4,468.35	5.77%
Freshwater - Drainage	156	4,217.38	5.44%
Freshwater - Invasive Freshwater Species	118	3,369.12	4.35%
Forestry - Forestry and Woodland Management	221	2,849.15	3.68%
Fire - Moor Burning	11	2,568.68	3.32%
Freshwater Pollution - Water Pollution - Discharge	112	2,328.97	3.01%
Agriculture - Agriculture - Other	97	1,905.96	2.46%
Agriculture - Inappropriate Stock-Feeding	9	1,819.67	2.35%
Public Access/Disturbance - Public Access/Disturbance	98	1,802.61	2.33%
Coastal - Coastal Squeeze	31	1,480.56	1.91%
Lack of Corrective Works - Inappropriate Weed Control	129	1,428.78	1.84%
Freshwater - Siltation	80	1,417.93	1.83%
Lack of Corrective Works - Inappropriate Ditch Management	103	1,308.97	1.69%
Freshwater - Inappropriate Weirs Dams and Other Structures	59	1,271.32	1.64%
Freshwater - Fish Stocking	57	1,186.24	1.53%
Forestry - Deer Grazing/Browsing	76	1,177.67	1.52%
Agriculture - Inappropriate Cutting/Mowing	103	1,174.71	1.52%
Agriculture - Inappropriate Csw/Esa Prescription	28	989.27	1.28%

## Biodiversity and Nature Conservation

Adverse Condition Reason	Num Units	Area of Units (ha)	% of unit area not meeting the PSA target
Agriculture - Fertiliser Use	28	752.14	0.97%
Freshwater - Water Abstraction	44	711.69	0.92%
Vehicles - Vehicles - Other	16	625.79	0.81%
Coastal - Inappropriate Coastal Management	32	624.08	0.81%
Fire - Fire - Other	36	517.06	0.67%
Vehicles - Vehicles - Illicit	24	406.11	0.52%
Earth Science - Earth Science Feature Obstructed	125	395.03	0.51%
Air Pollution - Air Pollution	13	371.64	0.48%
Game Management - Game Management - Other	9	297.92	0.38%
Planning Permission - Planning Permission - General	50	247.33	0.32%
Lack of Corrective Works - Inappropriate Pest Control	9	203.76	0.26%
Planning Permission - Peat Extraction	9	174.42	0.23%
Game Management - Game Management - Pheasant Rearing	11	97.61	0.13%
Planning Permission - Planning Permission - Other Mineral And Waste	14	91.13	0.12%
Coastal - Inappropriate Dredging	5	54.04	0.07%
Freshwater - Inland Flood Defence Works	9	35.29	0.05%
Earth Science - Earth Science Feature Removed	10	31.53	0.04%
Agriculture - Pesticide/Herbicide Use	1	5.02	0.01%

Source: Natural England: Designated Sites.

<https://designatedsites.naturalengland.org.uk/ReportUnitAdverseCondition.aspx?ReportTitle=All%20of%20England%20adverse%20conditions>

## Biodiversity and Nature Conservation

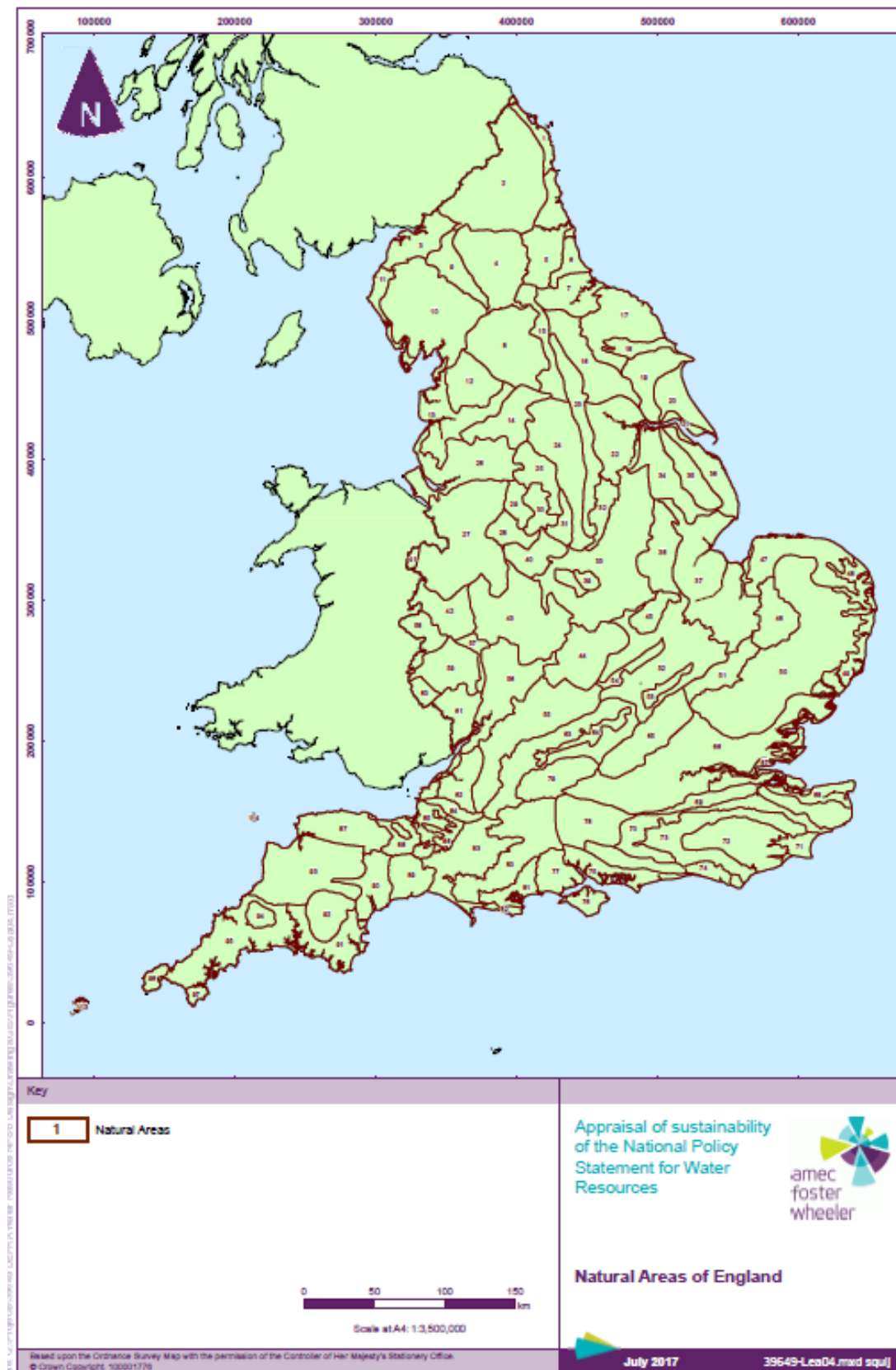
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### Natural Areas

Natural England has defined 120 (97 terrestrial, 23 marine) geographical areas of the English countryside, distinguished on the merit of their wildlife and other natural features, and also on historic land-use pattern. The boundaries of these zones should be considered as broad transition zones rather than hard, defined edges. The purpose of these areas is to characterise areas of England for their natural features outside, but inclusive of, the network of protected, designated sites (e.g. SPAs, SACs, SSSIs). Each Natural Area is characterised by geology and wildlife allowing a landscape scale approach to biodiversity. Natural Areas have been formally defined as “biogeographic zones which reflect the geological foundation, the natural systems and processes and the wildlife in different parts of England, and provide a framework for setting objectives for nature conservation” (UK Biodiversity Steering Group 1995). **Figure 1.12** identifies Natural Areas of England.

## Biodiversity and Nature Conservation

Figure 1.12 Natural Areas of England



## Biodiversity and Nature Conservation

**Table 1.8** lists the Natural Areas identified in **Figure 1.12**.

**Table 1.8** Natural Areas

Name	Reference	Name	Reference
North Northumberland Coastal Plain	1	East Anglian Chalk	51
Border Uplands	2	West Anglian Plain	52
Solway Basin	3	Bedfordshire Greensand Ridge	53
North Pennines	4	Yardley-Whittlewood Ridge	54
Northumbria Coal Measures	5	Cotswolds	55
Durham Magnesian Limestone Plateau	6	Severn And Avon Vales	56
Tees Lowlands	7	Malvern Hills And Teme Valley	57
Yorkshire Dales	8	Clun And North West Herefordshire Hills	58
Eden Valley	9	Central Hertfordshire	59
Cumbria Fells and Dales	10	Black Mountains and Golden Valley	60
West Cumbria Coastal Plain	11	Dean Plateau and Wye Valley	61
Forest of Bowland	12	Bristol, Avon Valleys and Ridges	62
Lancashire Plain and Valleys	13	Thames And Avon Vales	63
Southern Pennines	14	Midvale Ridge	64
Pennine Dales Fringe	15	Chilterns	65
Vale of York And Mowbray	16	London Basin	66
North York Moors and Hills	17	Greater Thames Estuary	67
Vale of Pickering	18	North Kent Plain	68
Yorkshire Wolds	19	North Downs	69
Holderness	20	Wealden Greensand	70
Humber Estuary	21	Romney Marshes	71
Humberhead Levels	22	High Weald	72
Southern Magnesian Limestone	23	Low Weald And Pevensey	73
Coal Measures	24	South Downs	74
Dark Peak	25	South Coast Plain and Hampshire Lowlands	75
Urban Mersey Basin	26	Isle of Wight	76
Mosses and Meres	27	New Forest	77
Potteries and Churnet Valley	28	Hampshire Downs	78
South West Peak	29	Berkshire And Marlborough Downs	79
White Peak	30	South Wessex Downs	80
Derbyshire Peak Fringe and Lower Derwent	31	Dorset Heaths	81
Sherwood	32	Isles Of Portland And Purbeck	82
Trent Valley and Rises	33	Wessex Vales	83
North Lincolnshire Coversands And Clay Vales	34	Mendip Hills	84

## Biodiversity and Nature Conservation

Name	Reference	Name	Reference
Lincolnshire Wolds	35	Somerset Levels and Moors	85
Lincolnshire Coast and Marshes	36	Mid Somerset Hills	86
The Fens	37	Exmoor And the Quantocks	87
Lincolnshire And Rutland Limestone	38	Vale of Taunton And Quantock Fringes	88
Charnwood	39	Blackdowns	89
Needwood And South Derbyshire Claylands	40	Devon Redlands	90
Oswestry Uplands	41	South Devon	91
Shropshire Hills	42	Dartmoor	92
Midlands Plateau	43	The Culm	93
Midland Clay Pastures	44	Bodmin Moor	94
Rockingham Forest	45	Cornish Killas And Granites	95
Breckland	46	West Penwith	96
North Norfolk	47	The Lizard	97
The Broads	48	Isles of Scilly	113
Suffolk Coast and Heaths	49	Lundy	114
East Anglian Plain	50		

### Priority species and Habitats

The Natural Environment and Rural Communities (NERC) Act came into force on 1st Oct 2006. Section 41 of the Act requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. The S41 list is used to guide decision-makers such as public bodies, including local and regional authorities, in implementing their duty under section 40 of the Natural Environment and Rural Communities Act 2006, to have regard to the conservation of biodiversity in England, when carrying out their normal functions. **Table 1.9** identifies in particular priority species and habitats for the freshwater environment.

Table 1.9 Freshwater priority species and habitats

Habitats	Species
Aquifer-fed naturally fluctuating water bodies	<i>Branta bernicla</i> Dark-bellied Brent Goose
Eutrophic standing waters	<i>Cygnus columbianus bewickii</i> Bewick's Swan
Mesotrophic lakes	<i>Emberiza schoeniclus schoeniclus</i> Reed Bunting
Oligotrophic and dystrophic lakes	<i>Motacilla flava</i> Yellow Wagtail
Ponds	<i>Numenius arquata</i> Curlew
Rivers	<i>Vanellus vanellus</i> Lapwing



## Biodiversity and Nature Conservation

Habitats	Species	
Reedbeds	<i>Arvicola terrestris</i>	Water Vole
Lowland fens	<i>Lutra lutra</i>	Otter
Coastal and floodplain grazing marsh	<i>Bufo bufo</i>	Common Toad
Wet woodland	<i>Natrix natrix</i>	Grass Snake
	<i>Triturus cristatus</i>	Great Crested Newt
	<i>Alosa alosa/fallax</i>	Allis/Twaite Shads
	<i>Anguilla anguilla</i>	European Eel
	<i>Lampetra fluviatilis</i>	River Lamprey
	<i>Osmerus eperlanus</i>	Smelt
	<i>Petromyzon marinus</i>	Sea Lamprey
	<i>Salmo salar</i>	Atlantic salmon
	<i>Salmo trutta</i>	Brown/Sea trout
	<i>Leersia oryzoides</i>	Cut-grass
	<i>Luronium natans</i>	Floating Water Plantain
	<i>Oenanthe fistulosa</i>	Tubular Water-dropwort
	<i>Potamogeton compressus</i>	Grass-wrack Pondweed
	<i>Pilularia globulifera</i>	Pillwort
	<i>Sium latifolium</i>	Greater Water Parsnip
	<i>Aeshna isosceles</i>	Norfolk Hawker
	<i>Austropotamobius pallipes</i>	White-clawed Crayfish
	<i>Coenagrion mercuriale</i>	Southern Damselfly
	<i>Margaritifera margaritifera</i>	Freshwater Pearl Mussel
	<i>Pisidium tenuilineatum</i>	Fine-lined Pea Mussel
	<i>Pseudanodonta complanata</i>	Depressed River Mussel
	<i>Valvata macrostoma</i>	Large-mouthed Valve Snail
	<i>Vertigo moulinsiana</i>	Desmoulin's Whorl Snail

## Biodiversity and Nature Conservation

### National Character Areas

England has been divided into areas with similar landscape character, which are called National Character Areas (NCAs). A total of 159 NCAs have been identified in England<sup>27</sup>. The boundaries of the NCAs are not precise and many should be considered as broad zones of transition. Natural England have rewritten and redesigned all of England's 159 NCA profiles and published the revised profiles in September 2014. The NCAs are defined by a unique combination of landscape, biodiversity, geodiversity, history, and cultural and economic activity (further discussion of National Character Areas is provided in **Section 14 – Landscape and Townscape**).

### Scotland

In Scotland there are:

- 152 SPAs, covering an area of 1,205,368 hectares (in addition to one site which straddles the border with England and is included under the England section above)<sup>28</sup>;
- 236 SACs covering an area of 2,289,782 hectares (in addition to three sites that straddle the border with England and is included under the England section above)<sup>29</sup>;
- 50 Ramsar sites covering a total area of 283,083 hectares (in addition to one site which straddles the border with England and is included under the England section above)<sup>30</sup>; and
- As of February 2014, 1,425 SSSIs covering 1,020,000 hectares or 13% of Scotland<sup>31</sup>.

In 2005, 71.4% of designated sites in Scotland (including SPAs, SACs, Ramsar and SSSI) were in favourable or unfavourable recovering condition. By March 2017, 80.3% of natural features on protected nature sites were assessed as being in favourable or unfavourable recovering condition<sup>32</sup>. During 2016-17, the condition of 91 features improved to favourable or recovering condition. During the same period, the condition of 79 natural features deteriorated to unfavourable condition. The greatest stresses on sites were identified as invasive species and over-grazing.

Scottish Natural Heritage identified a series of Natural Heritage Zones as part of their Natural Heritage Futures initiative and used these areas to describe a vision for sustainable use of local natural heritage. A total of 21 zones were identified<sup>33</sup>, each having their own identity resulting from the interaction of geology, landforms, wildlife and land use.

<sup>27</sup> Natural England (2014) *National Character Area profiles: data for local decision making*. Available online at: <https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making>

<sup>28</sup> Joint Nature Conservation Committee (2017) *Classified Special Protection Areas in the UK*. Available online at: <http://jncc.defra.gov.uk/page-1399>

<sup>29</sup> Joint Nature Conservation Committee (2017) *Special Areas of Conservation (SAC)*. Available online at: <http://jncc.defra.gov.uk/page-23>

<sup>30</sup> Joint Nature Conservation Committee (2017) *UK Ramsar sites*. Available online at: <http://jncc.defra.gov.uk/page-1388>

<sup>31</sup> Scottish Natural Heritage (2016) *Where are SSSIs found?* Available online at: <http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/sssis/sssi-location/>

<sup>32</sup> Scottish Natural Heritage (2017) *The Proportion of Scotland's Protected Sites in Favourable Condition 2016*. Available at: <http://www.snh.gov.uk/publications-data-and-research/official-statistics/official-stats/sites-favourable/>

<sup>33</sup> Scottish Natural Heritage (2002) *Natural Heritage Zones: A National Assessment of Scottish Landscapes*. Available online at: <http://www.snh.org.uk/futures/Data/pdffdocs/LANDSCAPES.pdf>

## Biodiversity and Nature Conservation

### Wales

More than 10% of Wales' land cover is designated for nature conservation. Natural Resources Wales State of Natural Resources Report (SoNaRR)<sup>34</sup> identifies the following key messages with regards to protected habitats and species:

- Wales has a wide representation of species across a broad range of taxonomic groups with estimates varying from 25,000 to 50,000 different species of animals, plants and other organisms;
- there are 20 Special Protection Areas (SPAs)<sup>35</sup> for internationally important populations of birds and 92 Special Areas of Conservation (SACs) for other threatened species and natural habitats;
- 562 of the total 1,016 Sites of Special Scientific Interest (SSSI) (as of 2010) have individually qualifying species and 54 have species assemblages which qualify. Many of the same species are also found on sites that qualify for their habitat; and
- the list of species and habitats of principal importance in Wales (the interim Section 7 list) includes 557 species.

Other internationally important sites to consider include the Rhinog Biogenetic Reserve in North Wales (Blaenau Ffestiniog WRZ) and the UNESCO biosphere reserve at Cors Fochno in the Dyfi estuary near Borth in Ceredigion (West Wales)<sup>36</sup>. There are 76 National Nature Reserves (NNRs) in Wales, all of which are legally protected as SSSIs. Most are also designated as SACs, SPAs or Ramsar sites<sup>37</sup>.

With respect to the condition of these sites, the SoNaRR report identifies that:

- the condition of SAC and SPA species features on sites in Wales, as reported in 2013, remains mostly unfavourable (55%), with the exception of birds and mammals of which 86% and 68% were in favourable condition, respectively;
- between 2002 and 2008, fewer than half of the species on the interim Section 7 list were considered to be stable or increasing; and
- Wales (along with the UK as a whole) did not meet the 2010 international and national biodiversity targets.

## 1.4 Summary of Existing Problems for Biodiversity and Nature Conservation Relevant to the Water Resources NPS

The SEA Directive requires consideration of any existing environmental problems which are relevant to the plan or programme, particularly those areas of environmental importance pursuant to Directives 2009/147/EC and 92/43/EC (the Birds and Habitats Directives). An analysis of the causes of unfavourable

<sup>34</sup> Natural Resources Wales (2016) *State of the Natural Resources Report*. Available online at:

<https://naturalresources.wales/evidence-and-data/research-and-reports/the-state-of-natural-resources-report-assessment-of-the-sustainable-management-of-natural-resources/?lang=en>

<sup>35</sup> The latest data from the Joint Nature Conservancy Council identifies 21 SPAs; 18 in Wales and 3 cross border SPAs between England and Wales.

<sup>36</sup> The UNESCO Biosphere Reserve status is awarded in recognition of the way a local community lives sustainably in an area of special landscape quality with a rich wildlife. The designated area includes Aberystwyth, Llanbrynmair, Llanymawddwy, Corris Uchaf, and Aberdyfi.

<sup>37</sup> Natural Resources Wales (2016) *National Nature Reserves*. Available online at:

<https://naturalresources.wales/conservation-biodiversity-and-wildlife/find-protected-areas-of-land-and-seas/national-nature-reserves/?lang=en>

## Biodiversity and Nature Conservation

condition and threats to the range of habitats by Natural England has revealed the key pressures and risks to be:

- habitat destruction and fragmentation by development;
- agricultural intensification and changes in agricultural management practices;
- changes in woodland and forestry management;
- water abstraction, drainage or inappropriate river management;
- inappropriate coastal management;
- lack of appropriate habitat management;
- atmospheric pollution (acid precipitation, nitrogen deposition);
- water pollution from both point and wider (diffuse) agricultural sources;
- climate change and sea level rise;
- sea fisheries practices;
- recreational pressure and human disturbance; and
- invasive and non-native species<sup>38</sup>.

The same threats occur across the devolved administrations in the UK. For example, the Scottish Biodiversity Strategy Report to the Scottish Parliament 2014-16<sup>39</sup> identified seven key issues for biodiversity in Scotland: pollution, land use intensification/modification, invasive species/diseases, lack of recognition of the value of nature, disconnection with nature, climate change and the use of marine resources.

**Table 1.10** presents an overview of the key issues for biodiversity and nature conservation relevant to the Water Resources NPS.

**Table 1.10 Biodiversity and Nature Conservation Problems Relevant to the Water Resources NPS**

Problem	Supporting Data	Implications
<b>Loss of biodiversity</b>	The status of UK priority habitats and species in 2012 indicates that the decline of biodiversity is a long-term issue. Between 2007 and 2012, populations of priority species declined by 4 per cent relative to their value in 2007. This decrease is not statistically significant. Within the index over this short-term period, 47 per cent of species showed an increase and 53 per cent showed a decline. By 2012, populations of priority species overall had declined to 33 per cent of the 1970 index value, a statistically significant decrease. Over this long-term period 25 per cent of species showed an increase and 75 per cent showed a decline.	Ensure policies do not adversely affect biodiversity.
<b>Risks to the condition of certain habitat features</b>	For NNRs, SSSIs, SPAs, SACs and RAMSAR sites, typically around 95% of the total site area is either in a favourable or recovering state. Whilst this is a positive testament to the efforts to improve these sites, it should be noted that those sites that are 'recovering' remain in an unfavourable state at present and gains in their status could be	Ensure policies do not adversely affect the status of conservation features.

<sup>38</sup> Natural England (2008) *State of the Natural Environment Report*

<sup>39</sup> Scottish Government (2017) *Scottish Biodiversity Strategy: Report to the Scottish Parliament 2014 – 2016*. Available online at: <http://www.gov.scot/Resource/0052/00522533.pdf>

## Biodiversity and Nature Conservation

Problem	Supporting Data	Implications
	reversed. This is particularly important for those sites that are vulnerable to changes in the local hydrological environment. It should be noted that those sites of nature conservation importance that were least favourable were often impacted by factors which operated outside the sites on which they were designated (e.g. drainage conditions for some isolated wetlands) and which require concerted effort by many agencies (e.g. water quality affecting fish).	
<b>Threats to UK freshwater habitats</b>	<p>UK freshwater habitats and their associated species are threatened by a range of factors. These include:</p> <ul style="list-style-type: none"> <li>• Point and diffuse pollution;</li> <li>• Water abstraction for drinking water; agricultural or industrial uses;</li> <li>• Invasive alien species;</li> <li>• Morphological alterations;</li> <li>• Recreation;</li> <li>• Fisheries management;</li> <li>• Climate change; and</li> <li>• Grazing/control of scrub and trees.</li> </ul> <p>It is anticipated that the NPS will have the ability to directly address a number of these affects, in particular pollution, water abstraction and addressing climate change. Consequently, these affects may be avoided, minimised or mitigated in accordance with the mitigation hierarchy.</p>	<b>Ensure policies do not</b> contribute to those factors identified as a threat to freshwater habitats and species.

## 1.5 Likely Evolution of the Baseline

### UK

The general global trend in biodiversity is towards a decreased level of variability among living organisms. The European Commission states that "The loss of biodiversity has accelerated to an unprecedented level in Europe and worldwide. It has been estimated that the current global extinction rate is 1,000 to 10,000 times higher than the natural background extinction rate. In Europe some 42% of European mammals are endangered, together with 15% of birds and 45% of butterflies and reptiles"<sup>40</sup>.

The global trend towards a decline in biodiversity is not mirrored in the UK. The annual review of UK Biodiversity Indicators comprises 51 measures, of which 5 are not assessed in the long term and 8 are not assessed in the short term. Of the 46 long-term measures, 22 show an improvement, compared to 13 of the measures that were deteriorating. Of the 43 short term measures, 17 show an improvement, as compared to 10 in decline. Measures that improved or deteriorated in the short term have not necessarily continued to improve or deteriorate respectively in the long term<sup>41</sup>.

Measures showing an improvement in the short term include: area of land in agri-environment schemes; sustainable fisheries; pressure from pollution; total extent of protected areas: at sea; status of UK species of European importance; animal genetic resources; plant genetic resources; fish size classes in the North Sea;

<sup>40</sup> European Commission (2016) *Why do we need to protect biodiversity*. Available online at: [http://ec.europa.eu/environment/nature/biodiversity/intro/index\\_en.htm](http://ec.europa.eu/environment/nature/biodiversity/intro/index_en.htm)

<sup>41</sup> Defra (2016) *UK Biodiversity Indicators 2015*. Available online at: [http://jncc.defra.gov.uk/pdf/UKBI\\_2015\\_v3a.pdf](http://jncc.defra.gov.uk/pdf/UKBI_2015_v3a.pdf)

## Biodiversity and Nature Conservation

greenhouse gas removals by UK forests; biodiversity data for decision making; and UK expenditure on international biodiversity.

Measures which have improved in the long term include: volunteer time spent in conservation; area of land in agri-environment schemes; area of forestry land certified as sustainably managed; sustainable fisheries; pressure from pollution; protected areas; wintering waterbirds; mammals of the wider countryside (bats); animal genetic resources; plant genetic resources; greenhouse gas removals by UK forests; cumulative number of records; and expenditure on UK and international biodiversity.

Measures showing long-term deterioration include: pressure from invasive species; status of UK priority species; birds of the wider countryside and at sea; insects in the wider countryside (butterflies); animal genetic resources – horse breeds; and status of pollinating insects.

Some of these measures have continued to deteriorate in the short term, including birds of the wider countryside and at sea and the status of pollinating insects.

A 2016 report by the UK's non-statutory wildlife organisations<sup>42</sup> sets out the following headline results of their assessment of the state of the UK's biodiversity resource:

- using records of 3,816 species, some 56% of these have declined since 1970 and 44% have increased;
- of the nearly 8,000 species assessed using modern Red List criteria, 15% are extinct or threatened with extinction from Great Britain;
- an index of species' status, based on abundance and occupancy data, has fallen by 16% since 1970, and 3% from 2002. An index describing the population trends of species of special conservation concern in the UK has fallen by 67% since 1970 and 12% from 2002;
- policy-driven agricultural change was the most significant driver of declines, although climate change has also had a significant impact, which included both beneficial and detrimental effects on species. Climate change is highlighted as one of the greatest long-term threats to nature globally; and
- a new measure that assesses how intact a country's biodiversity is suggests that the UK has lost significantly more nature over the long term than the global average.

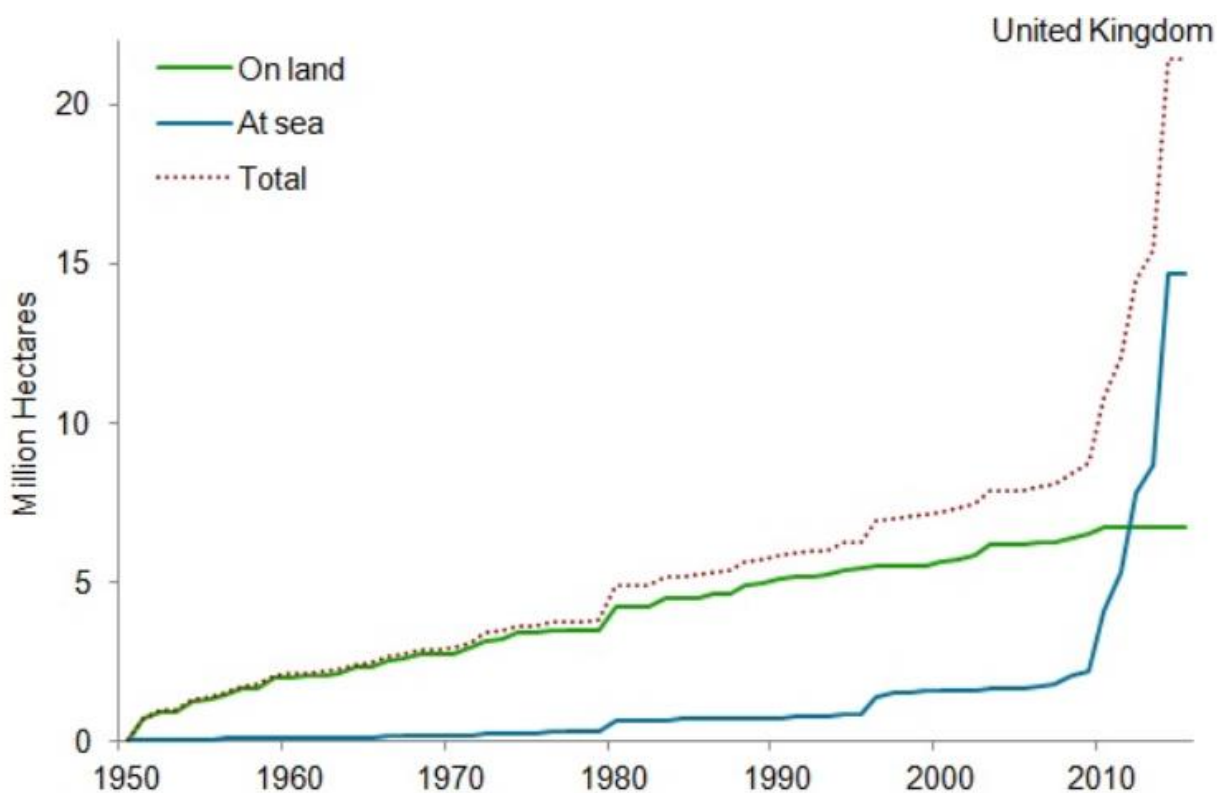
In response to these challenges and to ensure habitats and species receive protection in the UK, there has been an increase in the number of sites and areas protected for biodiversity, flora and fauna<sup>43</sup> (see **Figure 1.13**).

<sup>42</sup> Hayhow DB, Burns F, Eaton MA, *et al.* (2016) *State of Nature 2016*. The State of Nature partnership. Available online at: [http://www.rspb.org.uk/Images/State%20of%20Nature%20UK%20report\\_%2020%20Sept\\_tcm9-424984.pdf](http://www.rspb.org.uk/Images/State%20of%20Nature%20UK%20report_%2020%20Sept_tcm9-424984.pdf)

<sup>43</sup> Joint Nature Conservation Committee (2015) *Protected Areas*. Available online at: <http://jncc.defra.gov.uk/page-4241>

## Biodiversity and Nature Conservation

Figure 1.13 Extent of UK Nationally and Internationally Important Protected Areas: (i) on-land; (ii) at-sea, 1950 to 2015



**Source:** Joint Nature Conservation Committee, Natural England, Natural Resources Wales, Northern Ireland Environment Agency and Scottish Natural Heritage.

**Notes:** The boundary between protected areas on-land and at-sea is mean high water (mean high water spring in Scotland). Coastal sites in the indicator are split between 'on-land' and 'at-sea' if they cross the mean high water mark. At-sea extent includes offshore marine protected areas out to the limit of the UK continental shelf.

Based on calendar year of site designation. For 2015, the data cut-off is 31 July.

Extent is based on the following site designations: Areas of Special Scientific Interest, Sites of Special Scientific Interest, National Nature Reserves, Marine Conservation Zones, Nature Conservation Marine Protected Areas, Ramsar Sites, Special Areas of Conservation (including candidate Special Areas of Conservation and Sites of Community Importance), Special Protection Areas, Areas of Outstanding Natural Beauty, National Scenic Areas, National Parks.

The overall total extent of land and sea protected in the UK through national and international protected areas and through wider landscape designations, has increased by 10.7 million hectares over five years, from 10.8 million hectares in December 2010 to 21.4 million hectares at the end of July 2015. This increase is almost entirely down to the designation of inshore and offshore marine sites.

The indicator also shows the condition of Areas or Sites of Special Scientific Interest (A/SSSIs) on land. A/SSSIs are surveyed periodically to assess whether they are in good condition (favourable) or, if not, they are under positive management (unfavourable-recovering). Since 2005, the percentage of features or area of A/SSSIs in favourable or recovering condition has increased from 67% to 84% in 2010 and to 94.3% in 2017. This change reflects improved management of sites, but may also be affected by a greater number of sites/features having been assessed over time. The majority of protected areas on land are A/SSSIs, so the condition indicator is not representative of marine sites.



## Biodiversity and Nature Conservation

Natural capital accounts are a series of interconnected accounts that provide a structured set of information relating to the stocks of natural capital and flows of services supplied by them. They can relate to either physical accounts that classify and record measures of extent, condition and annual service flow, or monetary accounts that assign a monetary valuation to selected services on an annual basis and record an overall valuation of the natural asset's ability to generate future flows of services. Natural capital accounting is increasingly being used through the infrastructure sector to mainstream natural capital into decision making.

### Aichi Goals and Targets

The Strategic Plan for Biodiversity 2011-2020, agreed at Nagoya in the Aichi Prefecture, Japan at the tenth Conference of the Parties of the CBD established five strategic goals and 20 new global 'Aichi' targets. These were then reflected in the UK Post-2010 Biodiversity Framework (2012). Those relevant to the UK and set out in the UK Post 2010 Biodiversity Framework include, among others:

- **Strategic Goal B:** Reduce the direct pressures on biodiversity and promote sustainable use.
  - ▶ **Target 5:** By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.
  - ▶ **Target 7:** By 2020, areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.
- **Strategic Goal C:** To improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.
  - ▶ **Target 11:** By 2020, at least 17% of terrestrial and inland water, and 10% of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascapes.
  - ▶ **Target 12:** By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.
  - ▶ **Target 13:** By 2020, the genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.
- **Strategic Goal D:** Enhance the benefits to all from biodiversity and ecosystems.
  - ▶ **Target 15:** By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15% of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

### England

Results of the 2016 reporting of biodiversity indicators for England<sup>44</sup> reveal that, of the 51 individual measures making up the indicators, 17 of the 37 measures assessed over the long term show an

<sup>44</sup> Defra (2015) *Biodiversity 2020: a strategy for England's wildlife and ecosystem services – Indicators*. Available online at:

## Biodiversity and Nature Conservation

improvement, as do 20 of the 35 measures that are assessed over the short term. Some 11 measures (22%) show a decline in both the long term and the short term.

Those showing a deterioration over the long term are:

- change in the abundance of priority species – abundance;
- change in the abundance of priority species – distribution;
- woodland birds;
- butterflies of the wider countryside on woodland;
- breeding farmland birds;
- butterflies of the wider countryside on farmland;
- status of pollinating insects; and
- effective population size of native horse breeds at risk.

There has been a net decrease in the area of SSSIs in favourable condition; down from 44% in 2003 to 37% in 2015. It is evident from this that restoring species and habitats to favourable condition is difficult and to reverse previous declines in species populations or to restore the ecological functioning of habitats will take many years. However, the area of SSSIs in unfavourable recovering condition increased substantially from 13% in 2003 to 58.4% in 2015. The overall proportion of SSSIs in favourable or recovering condition remained above 95% since 2011. Looking at the condition of all sights designated for nature conservation (see **Figure 1.11**), approximately 50% of all sites are in an 'unfavourable – recovering' status as compared to 3% for 'unfavourable – declining'. This is a clear indication that the status of protected sites would be to continue to improve into the future, with an increasing number achieving favourable status.

The GB Non-native Species Strategy identifies that the number of non-native species entering GB is increasing, with 10-12 new non-native species becoming established every year and that this trend is mirrored across Europe and the rest of the world. If it is not addressed, it is expected to continue increasing for the foreseeable future<sup>45</sup>.

The total extent of land and sea protected in England through national and international protected areas increased from 1.2 million to 2.1 million hectares between 1999 and 2015, an increase of 74%.

Identifying an overall trend for biodiversity in England would be to risk masking various significant trends at the species / habitat level. The interaction between trends is also highly uncertain. For example, **Figure 1.13** identifies that an increasingly large area of the UK is being protected for nature conservation. The biodiversity indicators for England identify an ongoing decline in both the abundance and distribution of priority species. It is possible that the increasing area of protected land may halt the decline in biodiversity, but there is a high degree of uncertainty.

Three of the biodiversity indicators in decline relate directly to agricultural land, however agricultural practices may be affected by the UK's withdrawal from the European Union. How agricultural practices may change, and in turn the effect on biodiversity, is uncertain.

Whilst the overall trends remain challenging to predict, as the Appraisal of Sustainability progresses it will address specific biodiversity issues as a part of appraising the NPS. A key part of this process will be to identify specific trend data relevant to the appraisal. Any trends identified that assist in understanding the

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/492526/England\\_2015\\_full\\_publication.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/492526/England_2015_full_publication.pdf)

<sup>45</sup> Defra, Scottish Government, Welsh Government (2015) *The Great Britain Invasive Non-native Species Strategy*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/455526/gb-non-native-species-strategy-pb14324.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/455526/gb-non-native-species-strategy-pb14324.pdf)

## Biodiversity and Nature Conservation

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likely evolution of the baseline will be detailed in the Environmental Report throughout the stages of its preparation.

### Scotland

Results of the 2008 reporting round of the UK Biodiversity Action Plan indicate that in Scotland<sup>46</sup>:

#### Habitats:

- 13% of priority habitats were increasing (compared to 15% in 2005);
- 21% of priority habitats were stable (compared to 20% in 2005);
- 3% of habitats were declining (continuing/accelerating) (compared to 0% in 2005);
- 26% of habitats were declining (slowing) (compared to 29% in 2005);
- 16% of habitats were fluctuating (compared to 2% in 2005);
- 3% of habitats showed no clear trend (compared to 7% in 2005); and
- the status of 21% of habitats was unknown (compared to 27% in 2005).

#### Species:

- 4% of species were increasing (compared to 5% in 2005);
- 23% of species were stable (compared to 24% in 2005);
- 15% of species were fluctuating (compared to 3% in 2005);
- 11% of species were declining (slowing) (compared to 9% in 2005);
- 7% of species were declining (continuing/accelerating) (compared to 5% in 2005);
- 1% of species were lost (pre BAP publication) (no change since 2005);
- 7% of species showed no clear trend (compared to 8% in 2005); and
- the status of 32% of species was unknown (compared to 42% in 2005).

By March 2016, 80.4% of natural features on protected nature sites (SPAs, SACs, Ramsar and SSSI) were assessed as being in favourable or unfavourable recovering condition.

The latest monitoring information on biodiversity in Scotland was reported in 2010<sup>47</sup>. Based on the European BAP Framework, eight priority objectives, four supporting measures and 37 targets for action were specified for Scotland. By the end of 2010, 59% of these actions were on target (e.g. principal pollutant pressures on terrestrial and freshwater biodiversity substantially reduced by 2010), 24% had room for improvement (e.g. climate change adaptation and mitigation measures) and 16% were not on target (e.g. reducing the impact of invasive non-native species).

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<sup>46</sup> Scottish Government (2016) *Key Scottish Environment Statistics 2015*. Available online at: <http://www.gov.scot/Publications/2015/09/4066/318461>

<sup>47</sup> Mackey, E.C. and Mudge, G. (2010). *Scotland's Wildlife: An assessment of biodiversity in 2010*. Available online at: <http://www.snh.gov.uk/docs/B811968.pdf>

## Biodiversity and Nature Conservation

### Wales

The SoNaRR report identified the following trends:

- the extent and population for terrestrial, freshwater and marine species vary enormously within taxonomic groups; with some species increasing and some decreasing. For instance, both increases and decreases can be seen in birds, bats and many pollinator species (e.g. bees, butterflies) whilst for many species we do not have sufficient data on which to base any conclusions;
- there has been a marked reduction in the abundance of salmon in recent years, particularly in the southern regions of the species' range which is linked to increased mortality at sea. Although stocks in many of our industrial rivers have improved in the last 30 years, most stocks in Wales are severely challenged;
- all species are directly affected by changes in habitat quantity and quality. These changes are directly related to changes in the intensity of management regimes. Fragmentation and eutrophication create particular problems for many species; and
- there are risks to species and habitats due to their inability to respond to changing climatic conditions. There may also be opportunities from new species colonisations. Conversely, native wildlife may be increasingly at risk from pests, pathogens and invasive species. There are also risks from change in the frequency and/or magnitude of extreme weather and wildfire events. Climate change is influencing the expansion or contraction of some species' ranges and populations, and the increasing frequency of extreme climatic events, predicted in many climate change scenarios, may have serious implications.

## 1.6 Assessing Significance

The objectives and guide questions related to biodiversity and nature conservation which have been identified for use in assessing the effects of Water Resources NPS proposals and alternatives are set out in **Table 1.11**, together with reasons for their selection.

**Table 1.11 Approach to Assessing the Effects of the Water Resources NPS on Biodiversity and Nature Conservation**

Objective/Guide Question	Reasoning
<b>Objective: To protect and enhance biodiversity (habitats, species and ecosystems) working within environmental capacities and limits.</b>	<p>The SEA Directive (2001/42/EC) requires that the likely significant effects on biodiversity should be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.</p> <p>Water dependent habitats and species contribute to UK biodiversity. They can be affected by a range of factors (such as pollution, abstraction and invasive alien species) where water resources infrastructure could have positive and/or negative effects. Impacts may be direct (for example, the loss of, or damage to, habitats and species) or indirect (for example, disturbance due to noise and emissions to air associated with construction works). Water infrastructure can also contribute positively to biodiversity, introducing new features that can provide opportunities for nature and wildlife in the medium to long term. The inclusion of this AoS objective ensures that these effects can be considered within the AoS.</p>
Will the Water Resources NPS protect and/or enhance internationally designated nature	The Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC) include measures to maintain or restore important natural habitats and species including

## Biodiversity and Nature Conservation

Objective/Guide Question	Reasoning
conservation sites e.g. SACs, SPAs, Ancient Woodlands, Marine Protected Areas and Ramsar Sites?	through the designation of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).
Will the Water Resources NPS protect and/or enhance nationally designated nature conservation sites e.g. SSSIs?	The Wildlife and Countryside Act 1981 includes measures relating to protected sites. Devolved administrations have prepared detailed action plans on protecting habitats and species e.g. Biodiversity 2020 – A Strategy for England’s Wildlife and Ecosystem Services (Defra 2011), Scotland’s 2020 Challenge (a supplement to the Scottish Biodiversity Strategy 2004) and Wales Natural Resources Policy Statement (2015) and emerging National Natural Resource Policy.
Will the Water Resources NPS affect non-designated habitats and species including protected species?	The Wildlife and Countryside Act 1981 includes legislation relating to protected sites. Devolved administrations are preparing detailed action plans on protecting habitats and species.
Will the Water Resources NPS lead to a change in the ecological quality of habitats due to changes in groundwater/river water quality and/or quantity?	The Water Framework Directive (2000/60/EC) requires the setting of objectives that aim for all inland, coastal and groundwater water bodies to reach a ‘good’ chemical and ecological status (or for heavily modified water bodies this is ‘good’ ecological potential). Where this is disproportionately expensive or technically infeasible, member states may extend time limits as far as 2027, set alternative less stringent objectives or in extreme circumstances request a temporary derogation. Current WFD classifications indicate that there are still a large proportion of surface water bodies in England (and Wales) that are classified as being of Moderate Ecological status/potential or less. Government strategies such as the Water resources strategy for England and Wales (2009) and Water for Life (2011) include objectives to protect and improve the quality of water bodies.
Will the Water Resources NPS protect and/or enhance priority species and habitats or species on conservation concern?	The National Planning Policy Framework (NPPF) promotes the protection and enhancement of Species and Habitats of Principal Importance included in the England Biodiversity List published by the Secretary of State under section 41 of the Natural Environment and Rural Communities Act 2006 (known as priority species and habitats).
Will the Water Resources NPS affect the structure, function and resilience of natural systems (ecosystems)?	Biodiversity is a highly sensitive receptor. It is likely that many of the other topics considered in this report will have an effect on biodiversity. Ecosystems will be sensitive to these interconnected effects.
Will the Water Resources NPS affect the ecological network of protected areas and connectivity the between sites?	The integrity and functionality of ecosystems is dependent upon the interconnections between them.
Will the Water Resources NPS affect public access to areas of wildlife interest?	The Countryside and Rights of Way Act addresses public rights of way and access to open land.
Will the Water Resources NPS have an impact on fisheries?	Various inland waters could be affected by the Water Resources NPS meaning that the provisions of the Water Framework Directive (WFD) (2000/60/EC) apply as they relate to the quality of freshwaters needing protection or improvement in order to support fish life. Whilst the WFD refers to freshwaters, both marine and freshwater fisheries will be considered.
Will the Water Resources NPS lead to a net gain in biodiversity?	The principle of achieving a net gain in biodiversity is a core aspect of A Green Future: Our 25 Year Plan to Improve the Environment.
Will the Water Resources NPS have an impact on Marine Conservation Zones?	Marine conservation zones protect a range of nationally important marine wildlife, habitats, geology and geomorphology.

## Biodiversity and Nature Conservation

Objective/Guide Question	Reasoning
Will the Water Resources NPS affect the spread or transfer of invasive non-native species?	Invasive non-native species have a propensity to impact upon aquatic ecosystems and there is a risk that their spread will be facilitated by physical changes to those ecosystems.

**Table 1.12** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the biodiversity and nature conservation objective.

**Table 1.12 Illustrative Guidance for the Assessment of Significance for Biodiversity and Nature Conservation**

Effect	Description	Illustrative Guidance
++	Significant Positive	Option would have a significant and sustained positive effect on European or national designated sites and/or protected species. (e.g. – fully supports all conservation objectives on site, long-term increase in population of designated species); Option would create new areas of wildlife interest with improved public access in areas where there is a high demand for access to these sites. Option would lead to a site of importance for nature conservation gaining a favourable status. Option would significantly increase ecosystem resilience.
+	Positive	Option would have a minor positive effect on European or national designated sites and/or protected species (e.g. – supports one of the conservation objectives on site, short-term increase in population of designated species); Option would have a positive effect on local biodiversity (e.g. – through removal of all existing disturbance/pollutant emissions, or creation of new habitats leading to long-term improvement to ecosystem structure and function); Option would enhance existing public access to areas of wildlife interest in areas where there is some demand for these sites. Option would have a minor positive effect on the status of a site of importance for nature conservation. Option would have a minor positive effect on ecosystem resilience.
0	Neutral	Option would not have any effects on European or national designated sites and/or any species (including both designated and non-designated species); Option would not affect public rights of way or access to areas of wildlife interest.
-	Negative	Option would have negative effects on local biodiversity (e.g. – through an increase in disturbance/pollutant emissions, or some loss of habitat leading to temporary loss of ecosystem structure and function); Option would decrease public access to areas of wildlife interest in areas where there is some demand for access to these sites. Option would have a minor negative effect on the status of a site of importance for nature conservation. Option would have a minor negative ecosystem resilience.
--	Significant Negative	Option would have a negative effect on European or national designated sites and/or protected species (i.e. on the interest features and integrity of the site, by preventing any of the conservation objectives from being achieved or resulting in a long-term decrease in the population of a priority species). These effects could not be reasonably mitigated. Option would lead to a site of importance for nature conservation losing a favourable status. Option would significantly decrease ecosystem resilience.
?	Uncertain	From the level of information available the effect that the option would have on this objective is uncertain.

## Biodiversity and Nature Conservation

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### Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 1.13** presents the appraisal of the likely significant effects of the draft NPS and the 'no NPS' reasonable alternative on the biodiversity and nature conservation objective. The appraisal considers in-turn the three sub-sections used for each topic within Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making (subdivided into specific areas of interest) and Mitigation. The performance of the draft NPS and the 'no NPS' alternative are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters 1 – 3 of the draft NPS outlining how the remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the two reasonable alternatives is then summarised along with any proposed mitigation measures.



## Biodiversity and Nature Conservation

Table 1.13 Appraisal of the Draft NPS and Reasonable Alternatives: Biodiversity and Nature Conservation

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	+	+/?	<p><b>Draft NPS:</b> The text in the draft NPS under the heading of 'Applicant's Assessment' states:</p> <p>4.3.4 "Where the project is subject to EIA the applicant should ensure that the environmental statement clearly sets out any likely significant effects on internationally, nationally and locally designated sites of ecological or geological conservation importance (including those outside England) on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. The assessment should consider the full range of potential impacts on ecosystems including habitats, protected species or species identified as being of principal importance to biodiversity and nature conservation". However, the text does not provide guidance on the contents of an Environmental Statement (ES) with regards to biodiversity.</p> <p>4.3.5 "The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests."</p> <p>The requirement for the preparation of an ES (and where relevant Habitat Regulations Assessment (HRA)) will ensure that the likely effects on biodiversity are properly considered (subject to more detailed specification of the contents of the ES in respect of biodiversity). The requirement for conservation and enhancement, linked to environmental net gain, should help to promote activities such as habitat creation, where appropriate.</p> <p>Overall, the draft NPS has been assessed as having a positive effect on biodiversity and nature conservation.</p> <p><u>Recommendations for Improvement</u></p> <p>Whilst para 4.3.5 refers to net gain and cross refers to section 3.4 (Environmental Net Gain), this section could integrate further the principle of net gain, for example by providing further examples of net gain measures beyond the limited number presented in the table of potential impacts in the 'Introduction' section, and by ensuring the ES makes reference to net gain.</p> <p>There is no detailed guidance on the potential contents that should form part of the ES. It would be useful to supplement the current information with equivalent guidance. Specification of the contents of the ES could be drawn from the following<sup>48</sup> which in turn serves as the reference point for the detail of the 'Decision Making' section:</p> <ul style="list-style-type: none"> <li>• Scoping</li> </ul>

<sup>48</sup> Chartered Institute of Ecology and Environmental Management (2016) *Guidelines for Ecological Impact Assessment in the UK and Ireland*.

## Biodiversity and Nature Conservation

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>○ Identify the likely zone of influence of the proposed development.</li> <li>○ Identify and evaluate ecological resources and features (habitats, species and ecosystems, including ecosystem function and processes) likely to be affected (could include ecological survey/research).</li> <li>○ Describe any future anticipated changes to ecological conditions in the absence of the proposed project, to inform the assessment of impacts.</li> <li>○ Provide the basis for determining significance of effects arising from the impacts.</li> <li>• Impact assessment <ul style="list-style-type: none"> <li>○ Assess whether important ecological features will be subject to impacts and characterise these impacts and their effects (including scale, duration and significance).</li> <li>○ Assess the residual ecological impacts of the project remaining after mitigation and the significance of their effects, including cumulative effects.</li> </ul> </li> <li>• Avoidance, mitigation, compensation and enhancement <ul style="list-style-type: none"> <li>○ Identify and incorporate measures to avoid, reduce and compensate ecological impacts, and the provision of ecological enhancements including biodiversity net gain.</li> <li>○ Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.</li> </ul> </li> <li>• Advice for decision makers: <ul style="list-style-type: none"> <li>○ Provide advice on the consequences for decision making of the significant ecological impacts, based on the value of the affected resource or feature and consideration of the legal and policy framework throughout the impact assessment process.</li> </ul> </li> </ul> <p>This section could additionally highlight the importance of ongoing engagement with relevant nature conservation bodies including Natural England (and, for cross border impacts, Natural Resources Wales and Scottish Natural Heritage).</p> <p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of extant national planning policy, EIA Regulations and HRA Regulations which require consideration of the effects of development proposals on biodiversity. Further, proposals would continue to be identified through the WRMP process which would include the consideration of</p>

## Biodiversity and Nature Conservation

Draft NPS Section	Draft NPS	No NPS	Appraisal
			effects on biodiversity. In consequence, even without the NPS, this alternative would still be considered to have a positive effect in relation to biodiversity. However, the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level and could undermine the delivery of environmental net gain.
Decision Making	+	+/?	<p><b>Draft NPS:</b> A hierarchy of policy considerations is set out which require the consideration of biodiversity interests at the international, national, regional, local and site level. A general principle is established that development should avoid significant harm to biodiversity and geological conservation interests and should contribute overall to net biodiversity gain. As such, the likely effects are positive and impacts will be sought to be minimised, in line with the responsibilities under the Habitats Regulations, although broader strategic development considerations, such as the need for the development, could override biodiversity interests in protected areas.</p> <p>In stating the expectations for the consideration of the interests of protected areas (international, national, regional and local), the relevant NPS text should lead to positive effects, although decision making will seek to balance competing interests, potentially leaving certain assets vulnerable to overriding influences such as the need for development.</p> <p><u>Recommendations for Improvement</u></p> <p>This section could include specific reference to fisheries and ecological connectivity.</p> <p>It is considered that this section could usefully set out the role of HRA in the decision making process and that the Secretary of State must comply with the Habitats Regulations when considering development, where that development is likely to have a significant effect on a European site.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy, EIA Regulations and HRA Regulations and would be informed by the WRMP options identification and appraisal process which are considered to have a positive effect against the biodiversity assessment objective. However, the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level.</p>
Mitigation	+	+/?	<p><b>Draft NPS:</b> The proposed mitigation sets out the general expectations associated with water resources infrastructure proposals. More specific mitigation measures are provided in the table of potential impacts in the 'Introduction' section.</p>

## Biodiversity and Nature Conservation

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>Overall, it is considered that the draft NPS makes a positive contribution to this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>To inform the appraisal of this section of the draft NPS, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on biodiversity has been undertaken. This review is intended to help identify where any additional measures could be included in the draft NPS (in the introduction or mitigation section of the topic) to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p> <p>The following text identifies the anticipated biodiversity impacts and associated mitigation measures. These have been largely identified within the draft NPS and are discussed again here to ensure that the description of impacts is clear and provides the necessary context for the recommended mitigation measures. Where impacts discussed here have not been included within the draft NPS, they have been clearly identified.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p> <p><i>Construction</i></p> <p>As identified in the draft NPS, construction activity associated with new or enlarged reservoirs is likely to take place over an extended period and require substantial works including the use of heavy duty plant and machinery for groundworks, land re-profiling and creation of embankments. There may also be construction activity related to associated developments including pipelines, treatment works, pumping stations and any improvements to local roads.</p> <p>Generally, reservoirs will be sited on greenfield land and in consequence, the substantial land take that may be required for new reservoirs in particular (and associated development) could result in adverse impacts on species, cause damage to designated and non-designated sites and lead to the loss, fragmentation and isolation of habitats. There may also be disturbance to habitats and species arising from the use of plant, machinery and vehicle movements including noise and emissions to air whilst works may have hydrological impacts and cause pollution from site runoff to surface and groundwaters, particularly on-site watercourses.</p> <p>In addition to the effects identified in the draft NPS, works to existing reservoirs could affect the ecology the reservoir supports.</p> <p><i>Operation</i></p>

## Biodiversity and Nature Conservation

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>As identified in the draft NPS, the operation of new or enlarged reservoirs can have a wide range of adverse effects on biodiversity. For example, depending on the type of reservoir, there may be effects on downstream habitats and species associated with long-term changes to hydrological regimes, alterations to high and low flows, changes to morphological conditions (due to alterations in a river's sediment transport regime), and interruption to river continuity by the embankment which could affect migratory fish species in particular.</p> <p>Once operational, there is a strong potential for ecological benefits associated with new and enlarged reservoirs to be realised. Existing reservoirs commonly develop into conservation assets and many become designated sites in themselves and in this context, new habitats will be created for birds, fish and other species.</p> <p><b>Water Transfer Schemes</b></p> <p><i>Construction</i></p> <p>Pipeline and other works associated with water transfer schemes are likely to be large in scale, with potentially very long-distance routing. As identified in the draft NPS, in consequence, there is the potential for the loss of/disturbance to habitats and species (including adverse effects on designated nature conservation sites) associated with land take, the use of equipment/plant and vehicle movements across a large area (for example, related to noise and emissions to air). There is also the potential for the transfer of non-native species.</p> <p>Watercourses and the ecology they support are at particular risk where a water transfer scheme crosses a waterway. Effects in this regard can include:</p> <ul style="list-style-type: none"> <li>• the loss or damage of habitats and species;</li> <li>• creating a barrier to the movement of fish and other wildlife;</li> <li>• preventing sediment and woody debris being moved downstream; and</li> <li>• prevention of natural river movement.</li> </ul> <p>In addition to the effects identified in the draft NPS, contamination as a result of, for example, disturbance to earthworks and accidental spillage may affect groundwater, surface water and water courses in turn adversely affecting habitats and species associated with these ecosystems.</p> <p><i>Operation</i></p>

## Biodiversity and Nature Conservation

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>As identified in the draft NPS, during operation, there is the potential for some ongoing disturbance to habitats and species associated with the operational maintenance of any water transfer infrastructure. There are also risks associated with the transfer of non-indigenous species.</p> <p>In addition to the effects identified in the draft NPS, there may be opportunities for habitat creation associated with this infrastructure type (for example, through land restoration) and the transfer of water could increase water in the receiving system which may benefit water dependant receptors. However, the transfer of water could also affect flows within the donor waterbody which could adversely impact ecology.</p> <p><b>Desalination</b></p> <p><i>Construction</i></p> <p>Construction effects associated with desalination plants and associated development are anticipated to be similar to those of other large infrastructure schemes. As identified in the draft NPS, impacts may include, for example, the loss of/disturbance to habitats and species (including adverse effects on designated nature conservation sites) associated with land take and the use of equipment/plant (i.e. noise and emissions to air) as well as contamination/pollution due to, for example, disturbance to earthworks and accidental spillage. Additionally, there is the potential for adverse effects on coastal/marine habitats and species due to the location of desalination plants on the coastline and the requirement for the installation of water intakes. Effects in this regard may include, for example, underwater noise, barriers to the movement of mobile species and disturbance to habitats.</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, the operation of desalination plants has the potential to affect habitats and species including designated nature conservation sites. These effects may be associated with, for example, the entrapment of fish and marine mammals in intake screens, the discharge of brine and other chemicals and increased turbidity and seawater temperatures which can affect sensitive habitats and species.</p> <p>There may be opportunities for habitat creation associated with this infrastructure type.</p> <p><b>Potential additional mitigation measures identified through a review draft WRMPs and their associated Strategic Environmental Assessment (SEA) Environmental Reports include:</b></p> <ul style="list-style-type: none"> <li>• In-river and riparian improvement measures should be considered in the design of development.</li> <li>• HGV movements should be routed to avoid disturbance to designated nature conservation sites.</li> </ul>

## Biodiversity and Nature Conservation

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>Where appropriate, measures should be identified as part of the design of proposals to encourage public access to wildlife.</li> <li>Proposals should seek to create/contribute to a Nature Recovery Network.</li> </ul>
			<p><b>No NPS:</b> In the absence of a NPS, it is expected that appropriate mitigation measures would, in the first instance, be identified as part of the WRMP process and, subsequently, be considered by the competent authority in light of the proposals submitted. As such, mitigation measures will be applied but there is the risk that this is open to interpretation and thereby does not fully address an appropriate range of activities which are directly related to the scheme rather than generic in character which serve the interests of biodiversity and nature conservation.</p>
<b>Other Sections of the Draft NPS Relevant to Biodiversity and Nature Conservation</b>	<p>The following provides additional commentary on the text in other sections of the draft NPS relevant to biodiversity and nature conservation. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b>1. Introduction</b></p> <p><b>1.1. Background and scope of this NPS</b> – reference to the HRA prepared in support of the draft NPS will help will help ensure that the interests of European designated nature conservation sites are given proper consideration, notwithstanding the fact that there remains uncertainty over potential impacts, particularly in respect of the absence of specific locations and likely effects within the draft NPS.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on biodiversity in Scotland and Wales.</p> <p><b>1.3. Infrastructure covered by the Water Resources NPS</b> – as part of the options identification and appraisal process (including HRA and SEA undertaken in support of WRMPs) early consideration will be given to the impacts of options on biodiversity.</p> <p><b>1.8. Habitats considerations</b> – as above, the identification of the application of the HRA to the draft NPS will help ensure that the interests of European designated nature conservation sites are given proper consideration, notwithstanding the fact that there remains uncertainty over potential impacts, particularly in respect of the absence of specific locations and likely effects within the draft NPS.</p> <p><b>2. Government Policy and the need for water resources infrastructure</b></p> <p>The identification of factors underpinning the need to provide for nationally significant water resources infrastructure will benefit biodiversity interests through the adoption of a responsible approach to water supply/demand management. As such, this lessens risk to biodiversity interests over a wide area through potential damaging abstraction of water from rivers and aquifers.</p>		



## Biodiversity and Nature Conservation

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>2.2. Pressure on water availability now and in the future</b> – this section makes specific reference to protecting and enhancing the environment as a key driver of the need for nationally significant water resources infrastructure.</p> <p><b>2.3. A twin track approach to resilient water supplies</b>– this section makes specific reference to the role of catchment management and investing in natural capital as options for addressing need, alongside demand management and supply options.</p> <p><b>2.5. The role of water resource management plans in identifying the need</b> – as noted, as part of the options identification and appraisal process (including HRA and SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on biodiversity. This is reflected in paragraph 2.5.7.</p> <p><b>2.6. The role of nationally significant infrastructure projects</b> – this section highlights where/how water resources infrastructure, and in particular reservoirs, can deliver biodiversity benefits. The section identifies that alongside reservoirs, water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP, when assessed against the relevant threshold in the Planning Act 2008 or through a section 35 referral. These infrastructure types may have biodiversity effects of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p> <p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p><b><u>3. Assessment principles</u></b></p> <p><b>3.1. General principles of assessment</b> - the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, and opportunities to deliver an environmental net gain, provides the starting point for the protection and enhancement of biodiversity interests.</p> <p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including HRA and SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on biodiversity. In this context, this section highlights how the WRMP process could inform the DCO process with links to (inter alia) biodiversity.</p> <p><b>3.2. Environmental Impact Assessment</b> – the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that biodiversity interests are fully considered, as will the consideration of cumulative effects and interrelationships between effects. This section specifically highlights that information gathered from the WRMP options appraisal assessments and the draft NPS will also be useful to identify the significant effects of a proposed project.</p> <p><b>3.3. Habitats Regulations Assessment</b> – the interests of habitats and species of European importance are fully considered through the requirement for the consideration of likely significant effects as part of a HRA and involvement with statutory agencies.</p>

## Biodiversity and Nature Conservation

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<p><b>3.4. Environmental Net Gain</b>- consideration of opportunities for environmental net gain during the WRMP options appraisal process and in the detailed design of schemes will ensure protection and (where possible) enhancement of biodiversity interests, in accordance with the NPPF and 25 Year Environment Plan. It is noted that this section advises that water companies consider using natural capital accounting and ecosystem services assessments to inform planning and underpin environmental improvements and that <i>"Applications for development consent must be accompanied by a statement demonstrating how opportunities for environmental net gain have been incorporated into the detailed design (including any relevant operational aspects) of the project"</i>.</p> <p><b>3.5. Assessing alternatives</b> – the identification of reasonable alternatives including as part of the WRMP options appraisal process should ensure that biodiversity interests are taken into account, both in terms of protection and opportunities for mitigation and enhancement.</p> <p><b>3.6. Criteria for good design for water resources infrastructure</b> - attention to good design principles and implementation will be of benefit to biodiversity interests through the consideration of how a proposed scheme interacts with its context.</p> <p><b>3.7. Climate change adaptation</b> – incorporation of climate change adaptation into detailed design will ensure protection of biodiversity interests. Where adaptation measures have an adverse impact upon biodiversity interests, the impact in relation to the application as a whole and the assessment principles and guidance set out in the draft NPS will be considered by the Secretary of State.</p> <p><b>3.8. Environmental Regulation</b> – the various planning and pollution control regimes (e.g. control of abstractions; discharges; impounding water and any construction works that affect rivers, coastal or estuarine environments) will act to protect biodiversity interests, particularly where these are to be considered as part of the judgement on whether the development is an acceptable use of the land.</p>		
<b>Summary Appraisal of Likely Significant Effects</b>	+	+/?	<p><b>Draft NPS:</b> Application of the draft NPS is likely to result in positive effects in respect of the protection and enhancement of biodiversity interests, reflecting the specification of the parameters associated with the construction and operation of water resources infrastructure. The draft NPS framework will be applied in light of existing legislation at international and national levels in principle protecting biodiversity and nature conservation interests, although this will be a balancing exercise reflecting national need and other considerations.</p> <p>Proposed schemes may affect biodiversity interests during both construction (for example, associated with land take and disturbance to habitats and species) and operation (for example, due to changes in hydrological regimes), but the draft NPS provides for the application of clear mitigation measures, addressing direct and indirect effects, and promoting conservation and enhancement of biodiversity interests (including biodiversity net gain), resulting in positive effects. The wider considerations of the draft NPS reflected in the assessment principles such as environmental net gain, EIA, SEA, HRA, WRMP development, good design and pollution control is likely to result in positive effects.</p>

## Biodiversity and Nature Conservation

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy, EIA Regulations and HRA Regulations which are considered to have a positive effect against the biodiversity assessment objective. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on biodiversity. However, the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level.</p>
<p><b>Summary of Recommended Mitigation and Enhancement</b></p>	<p>The draft NPS makes a positive contribution to the biodiversity and nature conservation AoS objective. It identifies a range of issues that should be considered in terms of preparing and determining an application and mitigation. However, section 4.3 of the draft NPS could be enhanced through, in particular:</p> <ul style="list-style-type: none"> <li>strengthening of linkages to the NPPF and PPG;</li> <li>highlighting the importance of ongoing engagement with relevant nature conservation bodies;</li> <li>provision of further guidance on the possible contents of an ES;</li> <li>integrating further the environmental net gain principle;</li> <li>signposting to HRAs prepared in support of the draft NPS and WRMPs;</li> <li>inclusion of specific reference to fisheries and ecological connectivity;</li> <li>setting out the role of HRA in the decision making process.</li> </ul> <p>Additional project-level mitigation for inclusion in the draft NPS is suggested based on a review of draft WRMPs and their associated SEA Environmental Reports. This includes:</p> <ul style="list-style-type: none"> <li>In-river and riparian improvement measures should be considered in the design of development.</li> <li>HGV movements should be routed to avoid disturbance to designated nature conservation sites.</li> <li>Where appropriate, measures should be identified as part of the design of proposals to encourage public access to wildlife.</li> <li>Proposals should seek to create/contribute to a Nature Recovery Network.</li> </ul>		

## Biodiversity and Nature Conservation

### Annex A

Table A.1 Species Used to Calculate Wild Bird Population Indices

Woodland Birds	Waterbirds	Seabirds	Farmland Birds	Other Species
<b>Blackbird (<i>Turdus merula</i>)</b>	<i>Common sandpiper (Actitis hypoleucos)</i>	<i>Arctic skua (Stercorarius parasiticus)</i>	<i>Greenfinch (Carduelis chloris)</i>	<i>Avocet (Recurvirostra avosetta)</i>
<b>Blue tit (<i>Cyanistes caeruleus</i>)</b>	<i>Dipper (Cinclus cinclus)</i>	<i>Arctic tern (Sterna paradisaea)</i>	<i>Jackdaw (Corvus monedula)</i>	<i>Bearded tit (Panurus biarmicus)</i>
<b>Bullfinch (<i>Pyrrhula pyrrhula</i>)</b>	<i>Goosander (Mergus merganser)</i>	<i>Black Legged Kittiwake (Rissa tridactyla)</i>	<i>Kestrel (Falco tinnunculus)</i>	<i>Black-headed gull (Chroicocephalus ridibundus)</i>
<b>Chaffinch (<i>Fringilla coelebs</i>)</b>	<i>Grey wagtail (Motacilla cinerea)</i>	<i>Common guillemot (Uria aalge)</i>	<i>Reed bunting (Emberiza schoeniclus)</i>	<i>Buzzard (Buteo buteo)</i>
<b>Dunnock (<i>Prunella modularis</i>)</b>	<i>Coot (Fulica atra)</i>	<i>Common tern (Sterna hirundo)</i>	<i>Rook (Corvus frugilegus)</i>	<i>Carrion crow (Corvus corone)</i>
<b>Great tit (<i>Parus major</i>)</b>	<i>Great-crested grebe (Podiceps cristatus)</i>	<i>European shag (Phalacrocorax aristotelis)</i>	<i>Woodpigeon (Columba palumbus)</i>	<i>Girl bunting (Emberiza cirlus)</i>
<b>Lesser whitethroat (<i>Sylvia curruca</i>)</b>	<i>Little grebe (Tachybaptus ruficollis)</i>	<i>Great black-backed gull (Larus marinus)</i>	<i>Yellow wagtail (Motacilla flava)</i>	<i>Collared dove (Streptopelia decaocto)</i>
<b>Longtailed tit (<i>Aegithalos caudatus</i>)</b>	<i>Mallard (Anas platyrhynchos)</i>	<i>Great cormorant (Phalacrocorax carbo)</i>	<i>Corn bunting (Emberiza calandra)</i>	<i>Corncrake (Crex crex)</i>
<b>Robin (<i>Erithacus rubecula</i>)</b>	<i>Moorhen (Gallinula chloropus)</i>	<i>Herring gull (Larus argentatus)</i>	<i>Goldfinch (Carduelis carduelis)</i>	<i>Cuckoo (Cuculus canorus)</i>
<b>Song thrush (<i>Turdus philomelos</i>)</b>	<i>Cetti's warbler (Cettia cetti)</i>	<i>Little tern (Sternula albifrons)</i>	<i>Grey partridge (Perdix perdix)</i>	<i>Dartford warbler (Sylvia undata)</i>
<b>Tawny owl (<i>Strix aluco</i>)</b>	<i>Reed bunting (Emberiza schoeniclus)</i>	<i>Northern fulmar (Fulmarus glacialis)</i>	<i>Lapwing (Vanellus vanellus)</i>	<i>Firecrest (Regulus ignicapilla)</i>
<b>Wren (Troglodytes troglodytes)</b>	<i>Reed warbler (Acrocephalus Scirpaceus)</i>	<i>Razorbill (Alca torda)</i>	<i>Linnet (Carduelis cannabina)</i>	<i>Gadwall (Anas strepera)</i>
<b>Blackcap (<i>Sylvia atricapilla</i>)</b>	<i>Sedge warbler (Acrocephalus Schoenobaenus)</i>	<i>Sandwich tern (Sterna sandvicensis)</i>	<i>Skylark (Alauda arvensis)</i>	<i>Golden plover (Pluvialis apricaria)</i>
<b>Capercaillie (<i>Tetrao urogallus</i>)</b>	<i>Curlew (Numenius arquata)</i>		<i>Starling (Sturnus vulgaris)</i>	<i>Greylag goose (Anser anser)</i>
<b>Chiffchaff (<i>Phylloscopus collybita</i>)</b>	<i>Lapwing (Vanellus vanellus)</i>		<i>Stock dove (Columba oenas)</i>	<i>Hen harrier (Circus cyaneus)</i>

## Biodiversity and Nature Conservation

Woodland Birds	Waterbirds	Seabirds	Farmland Birds	Other Species
<b>Coal tit (<i>Periparus ater</i>)</b>	Little egret ( <i>Egretta garzetta</i> )		Tree sparrow ( <i>Passer montanus</i> )	Hobby ( <i>Falco subbuteo</i> )
<b>Crossbill (<i>Loxia curvirostra</i>)</b>	Redshank ( <i>Tringa totanus</i> )		Turtle dove ( <i>Streptopelia turtur</i> )	Hooded crow ( <i>Corvus cornix</i> )
<b>Garden warbler (<i>Sylvia borin</i>)</b>	Snipe ( <i>Gallinago gallinago</i> )		Whitethroat ( <i>Sylvia communis</i> )	House martin ( <i>Delichon urbicum</i> )
<b>Goldcrest (<i>Regulus regulus</i>)</b>	Teal ( <i>Anas crecca</i> )			House sparrow ( <i>Passer domesticus</i> )
<b>Green woodpecker (<i>Picus viridis</i>)</b>	Yellow wagtail ( <i>Motacilla flava</i> )			Magpie ( <i>Pica pica</i> )
<b>Jay (<i>Garrulus glandarius</i>)</b>	Grey Heron ( <i>Ardea Cinerea</i> )			Meadow pipit ( <i>Anthus pratensis</i> )
<b>Lesser redpoll (<i>Carduelis cabaret</i>)</b>	Kingfisher ( <i>Alcedo Atthis</i> )			Mediterranean gull ( <i>Larus melanocephalus</i> )
<b>Lesser spotted woodpecker (<i>Dendrocopos minor</i>)</b>	Oystercatcher ( <i>Haematopus ostralegus</i> )			Mistle thrush ( <i>Turdus viscivorus</i> )
<b>Marsh tit (<i>Poecile palustris</i>)</b>	Sand Martin ( <i>Riparia Riparia</i> )			Peregrine ( <i>Falco peregrinus</i> )
<b>Nightingale (<i>Lusciniamegarhynchos</i>)</b>	Tufted duck ( <i>Aythya fuligula</i> )			Pied/white wagtail ( <i>Motacilla alba</i> )
<b>Nuthatch (<i>Sitta europaea</i>)</b>	Mute swan ( <i>Cygnus olor</i> )			Pochard ( <i>Aythya ferina</i> )
<b>Pied flycatcher (<i>Ficedula hypoleuca</i>)</b>				Quail ( <i>Coturnix coturnix</i> )
<b>Redstart (<i>Phoenicurusphoenicurus</i>)</b>				Raven ( <i>Corvus corax</i> )
<b>Siskin (<i>Carduelis spinus</i>)</b>				Red-breasted merganser ( <i>Mergus serrator</i> )
<b>Sparrowhawk (<i>Accipiter nisus</i>)</b>				Red grouse ( <i>Lagopus lagopus scotica</i> )
<b>Spotted flycatcher (<i>Muscicapa striata</i>)</b>				Red kite ( <i>Milvus milvus</i> )

## Biodiversity and Nature Conservation

Woodland Birds	Waterbirds	Seabirds	Farmland Birds	Other Species
Tree creeper ( <i>Certhia familiaris</i> )				Shelduck ( <i>Tadorna tadorna</i> )
Tree pipit ( <i>Anthus trivialis</i> )				Shoveler ( <i>Anas clypeata</i> )
Willow tit ( <i>Parus montana</i> )				Stonechat ( <i>Saxicola rubicola</i> )
Willow warbler ( <i>Phylloscopus trochilus</i> )				Swallow ( <i>Hirundo rustica</i> )
Wood warbler ( <i>Phylloscopus sibilatrix</i> )				Swift ( <i>Apus apus</i> )
				Whinchat ( <i>Saxicola rubetra</i> )
				Woodlark ( <i>Lullula arborea</i> )

## Biodiversity and Nature Conservation

Table A.2 Species Used to Calculate the Wintering Waterbird Measure

<b>Anas acuta (Pintail)</b>	<b>Branta bernicla hrota (Svalbard light-bellied brent goose)</b>	<b>Limosa limosa (Black-tailed godwit)</b>
<b>Anas clypeata (Shoveler)</b>	Branta bernicla hrota (Nearctic light-bellied brent goose)	Mergus merganser (Goosander)
<b>Anas crecca (Teal)</b>	Branta leucopsis (Svalbard barnacle goose)	Mergus serrator (Red-breasted merganser)
<b>Anas Penelope (Wigeon)</b>	Branta leucopsis (Nearctic barnacle goose)	Numenius arquata (Curlew)
<b>Anas platyrhynchos (Mallard)</b>	Bucephala clangula (Goldeneye)	Phalacrocorax carbo (Cormorant)
<b>Anas strepera (Gadwall)</b>	Calidris alba (Sanderling)	Pluvialis apricaria (Golden plover)
<b>Anser albifrons (European white-fronted goose)</b>	Calidris alpine (Dunlin)	Pluvialis squatarola (Grey plover)
<b>Anser albifrons flavirostris (Greenland white-fronted goose)</b>	Calidris canuta (Knot)	Podiceps cristatus (Great crested grebe)
<b>Anser (Greylag goose - Icelandic population)</b>	Calidris maritime (Purple sandpiper)	Recurvirostra avosetta (Avocet)
<b>Anser (British/Irish greylag goose)</b>	Charadrius hiaticula (Ringed plover)	Somateria mollissima (Eider)
<b>Anser brachyrhynchus (Pink-footed goose)</b>	Cygnus columbianus (Bewick's swan)	Tachybaptus ruficollis (Little grebe)
<b>Arenaria interpres (Turnstone)</b>	Cygnus (Whooper swan)	Tadorna (Shelduck)
<b>Aythya farina (Pochard)</b>	Cygnus olor (Mute swan)	Tringa tetanus (Redshank)
<b>Aythya fuligula (Tufted duck)</b>	Fulica atra (Coot)	Vanellus (Lapwing)
<b>Aythya marila (Scaup)</b>	Haematopus ostralegus (Oystercatcher)	
<b>Branta bernicla (Dark-bellied brent goose)</b>	Limosa lapponica (Bar-tailed godwit)	



## Biodiversity and Nature Conservation

Table A.3 Species Used to Calculate Butterfly Population Indices

Generalist Butterflies	Habitat Specialist Butterflies
<b><i>Aglais io</i> (Peacock)</b>	<i>Apatura iris</i> (Purple emperor)
<b><i>Aglais urticae</i> (Small tortoiseshell)</b>	<i>Argynnis adippe</i> (High brown fritillary)
<b><i>Anthocharis cardamines</i> (Orange-tip)</b>	<i>Argynnis aglaja</i> (Dark green fritillary)
<b><i>Aphantopus hyperantus</i> (Ringlet)</b>	<i>Argynnis paphia</i> (Silver-washed fritillary)
<b><i>Aricia agestis</i> (Brown argus)</b>	<i>Aricia artaxerxes</i> (Northern brown argus)
<b><i>Celastrina argiolus</i> (Holly blue)</b>	<i>Boloria euphrosyne</i> (Pearl-bordered fritillary)
<b><i>Coenonympha pamphilus</i> (Small heath)</b>	<i>Boloria selene</i> (Small pearl-bordered fritillary)
<b><i>Erebia aethiops</i> (Scotch argus)</b>	<i>Callophrys rubi</i> (Green hairstreak)
<b><i>Favonius quercus</i> (Purple hairstreak)</b>	<i>Coenonympha tullia</i> (Large heath)
<b><i>Gonepteryx rhamni</i> (Brimstone)</b>	<i>Cupido minimus</i> (Small blue)
<b><i>Lasiommata megera</i> (Wall)</b>	<i>Erynnis tages</i> (Dingy skipper)
<b><i>Lycaena phlaeas</i> (Small copper)</b>	<i>Euphydryas aurinia</i> (Marsh fritillary)
<b><i>Maniola jurtina</i> (Meadow brown)</b>	<i>Hamearis lucina</i> (Duke of Burgundy)
<b><i>Melannargia galathea</i> (Marbled white)</b>	<i>Hesperia comma</i> (Silver-spotted skipper)
<b><i>Ochlodes sylvanus</i> (Large skipper)</b>	<i>Hipparchia semele</i> (Grayling)
<b><i>Pararge aegeria</i> (Speckled wood)</b>	<i>Leptidea sinapis</i> (Wood white)
<b><i>Pieris brassicae</i> (Large white)</b>	<i>Limenitis camilla</i> (White admiral)
<b><i>Pieris napi</i> (Green-veined white)</b>	<i>Melitaea athalia</i> (Heath fritillary)
<b><i>Pieris rapae</i> (Small white)</b>	<i>Papilio machaon</i> (Swallowtail)
<b><i>Polygonia c-album</i> (Comma)</b>	<i>Plebeius argus</i> (Silver-studded blue)
<b><i>Polyommatus icarus</i> (Common blue)</b>	<i>Polyommatus bellargus</i> (Adonis blue)
<b><i>Pyronia tithonus</i> (Gatekeeper)</b>	<i>Polyommatus coridon</i> (Chalkhill blue)
<b><i>Satyrus w-album</i> (White-letter hairstreak)</b>	<i>Pyrgus malvae</i> (Grizzled skipper)
<b><i>Thymelicus sylvestris</i> (Small skipper)</b>	<i>Satyrus pruni</i> (Black hairstreak)
	<i>Thecla betulae</i> (Brown hairstreak)
	<i>Thymelicus acteon</i> (Lulworth skipper)

## Population, Economics and Skills

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# 2. Population, Economics and Skills

## 2.1 Introduction

This section presents the overview of plans, programmes and baseline information for the appraisal of sustainability of the National Policy Statement for Water Resources Infrastructure and reasonable alternatives in respect of population, economics and skills.

There are links between the population, economics and skills topic and a number of other topics in the Appraisal of Sustainability (AoS), in particular human health, traffic and transport, air quality and climate change.

## 2.2 Review of Plans and Programmes

The review identified a range of plans and programmes that seek to enhance the economy of the UK and ensure that the economy develops in accordance with the principles of sustainable development. Whilst not directly commenting on water infrastructure, they provide the context for economic growth for the country, with the associated increase in the demand for water resources from the commercial, agricultural, industrial and residential sectors.

The **National Infrastructure Delivery Programme** identifies that water and waste infrastructure are essential for health and wellbeing, environmental sustainability and economic stability. Water services are likely to come under increasing pressure because of population growth and a changing climate, whilst wastewater treatment infrastructure is essential for public health and a clean environment. Sufficient capacity is also required to safely and effectively recycle or dispose of all household and commercial waste produced.

### International/European

The United Nations **World Summit on Sustainable Development (2002)** resulted in the Johannesburg Declaration on Sustainable Development, which reaffirmed the Millennium Development Goals and addresses issues such as poverty and economic development.

**Europe 2020 (2010)** is Europe's economic growth strategy. It aims to deliver growth that is smart, sustainable and inclusive and sets objectives on employment, innovation, education, social inclusion and climate/ energy - to be reached by 2020. **The European Employment Strategy (1997)**, also known as the Luxembourg process provides a set of common objectives and targets for employment policy. Its main aim is the creation of more and better jobs throughout the EU, as well as increasing productivity and the promotion of inclusion by addressing disparities in access to labour markets. It now constitutes part of the Europe 2020 growth strategy and it is implemented through the European semester, an annual process promoting close policy coordination among EU Member States and EU Institutions. These overarching aims are further espoused in the **Europe 2020 Integrated Guidelines (2015)**, which give guidance to Member States on implementing reforms. Key social and economic initiatives under the strategy include the 'Agenda for new skills and growth' and the 'European platform against poverty'. Alongside reducing poverty, these plans and programme along seek to reduce income inequality.

The **EU Sustainable Development Strategy** adopted in 2001 and reviewed in 2006 and 2009 also includes indicators relating to economic development and employment rates.

## Population, Economics and Skills

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### UK

**Securing the Future – the UK Sustainable Development Strategy (2005)** aims to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations. The Strategy has five guiding principles:

- living within environmental limits;
- ensuring a strong, healthy and just society;
- achieving a sustainable economy;
- promoting good governance; and
- using sound science responsibly.

The UK Government's **Plan for Growth (2011)** announced a programme of structural reforms to remove barriers to growth for businesses and equip the UK to compete in the global race. These reforms span a range of policies including improving UK infrastructure, cutting red tape, root and branch reform of the planning system and boosting trade and inward investment, to achieve the Government's four ambitions for growth:

- creating the most competitive tax system in the G20;
- encouraging investment and exports as a route to a more balanced economy;
- making the UK the best place in Europe to start, finance and grow a business; and
- creating a more educated workforce that is the most flexible in Europe.

In 2015, the UK Government launched **Fixing the Foundations: Creating a More Prosperous Nation** which aims to increase growth through higher productivity. This approach includes long-term investment in skills and businesses as well as flexible and competitive markets.

The UK's reform plans for promoting growth and employment to meet the Europe 2020 goals are set out in **Europe 2020: UK National Reform Programme 2015 (2015)**.

In 2016, the UK Government published an updated **National Infrastructure Delivery Plan**. This sets out the Government's plan to 2021 and beyond and takes a targeted approach to infrastructure investment and delivery across different sectors. It contains major commitments to improve the UK's transport, energy, communications, waste, water, housing and science and research infrastructure as well as steps to attract new private sector investment.

### England

The **Local Growth White Paper (2010)** sets out the Government's overarching goal to promote strong, sustainable and balanced growth. It restates the Government's role in providing the framework for conditions for sustainable growth by:

- creating macroeconomic stability, so that interest rates stay low and businesses have the certainty they need to plan ahead;
- helping markets work more effectively, to encourage innovation and the efficient allocation of resources;
- ensuring that it is efficient and focused in its own activities, prioritising high-value spending and reducing tax and regulatory burdens; and

## Population, Economics and Skills

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- ensuring that everyone in the UK has access to opportunities that enable them to fulfil their potential.

The White Paper focuses on the approach to local growth proposing measures to shift power away from central government to local communities, citizens and independent providers. In particular, it introduced Local Enterprise Partnerships (LEPs) to provide a vision and leadership for sustainable local economic growth. The number of LEPs has increased from the 24 originally announced to 39. The Local Growth Fund gives LEPs access to central government funding, ensuring that this money is spent in line with local priorities.

The Green Paper ***Building our Industrial Strategy (2017)*** acts as a starting point in an ongoing consultation on the governments developing industrial strategy. It is based around 10 pillars: science, research and innovation; skills; infrastructure; business growth and investment; procurement; trade and investment; affordable energy; sectoral policies; driving growth across the whole country; and creating the right institutions to bring together sectors and places. Water supplies for businesses and people are identified as vital for economic growth under the infrastructure pillar.

The ***National Planning Policy Framework (MHCLG, 2018)*** sets out the core land-use principles to deliver sustainable development. It notes the three dimensions to sustainable development: economic, social and environmental and highlights the importance under the economic role of planning policy in ensuring that sufficient land of the right type is available in the right places and at the right time to support growth and innovation; and by identifying and coordinating development requirements, including the provision of infrastructure.

The ***Government's Strategic Priorities for Ofwat: Affordable, Resilient Water Supplies (2017)*** sets out the strategic priorities and objectives for Ofwat, the independent economic regulator of the water industry. It includes a strategic objective for Ofwat to address affordability issues as well as one to challenge the water sector to plan and invest to meet the needs of current and future customers, in a way which offers best value for money over the long term.

## Scotland

Scotland's ***Third National Planning Framework (2014)*** underlines the government's central purpose to create a more successful country for all of Scotland to flourish, through increasing sustainable economic growth. The NPF is underpinned by four interlinked visions which set out the planning strategy for Scotland. These visions are:

- A successful, sustainable place;
- A low carbon place;
- A natural, resilient place; and
- A connected place

***Scotland's Economic Strategy (2015)*** sets out four strategic priorities which are intended to help increase competitiveness and tackle inequalities across the country. These priorities are:

- Investing in people and infrastructure in a sustainable way;
- Fostering a culture of innovation and research and development;
- Promoting inclusive growth and creating opportunity through a fair and inclusive jobs market; and

## Population, Economics and Skills

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- Promoting Scotland on the international stage to boost trade and investment, influence and networks.

**Scottish Planning Policy (2014)** is a statement of Scottish Government policy on how nationally important land use planning matters should be addressed in Scotland. It promotes consistency in the application of policy across Scotland whilst allowing sufficient flexibility to reflect local circumstances. The seven core values of Scottish Planning Policy are:

- Focus on outcomes, maximising benefits and balancing competing interests;
- Play a key role in facilitating sustainable economic growth, particularly the creation of new jobs and the strengthening of economic capacity and resilience within communities;
- Be plan-led, with plans being up-to-date and relevant;
- Make decisions in a timely, transparent and fair way to provide a supportive business environment and engender public confidence in the system;
- Be inclusive, engaging all interests as early and effectively as possible;
- Be proportionate, only imposing conditions and obligations where necessary; and
- Uphold the law and enforce the terms of decisions made.

The Scottish Government's **Regeneration Strategy: Achieving A Sustainable Future (2011)** underlines the challenges faced by some of the most disadvantaged communities and the responses required to help create a Scotland where all places are sustainable, and where people want to live, work and invest. The regeneration of Scotland's most disadvantaged areas and strengthening of local communities are key priorities.

**A Plan for Scotland: The Government's Programme for Scotland 2016-17 (2016)** sets the actions the Scottish Government will take 2016-17 and beyond. It focuses on an education system providing opportunities for all, an economy with more jobs and fair work, public services fit for the future and empowering people and communities.

**Working for Growth: A Refresh of the Employability Framework for Scotland (2012)** provides a clear framework to strengthen Scotland's focus on jobs and growth. It does so under the following themes:

- Strategy and Effective Leadership;
- Better Integration and Partnership Working;
- Towards Prevention - Tackling Inequality; and
- Improving Performance.

A report completed for the Scottish Government by the UK Commission for Employment and Skills (UKCES) entitled **Towards Ambition 2020: skills, jobs, growth for Scotland (2009)** found that Scotland's skills base has improved considerably but this has not translated into higher productivity and economic growth. In response to this, the Scottish Government prepared **Skills for Scotland: Accelerating the Recovery and Increasing Sustainable Economic Growth (2010)**. This strategy focuses on the following four key themes:

- Empowering people;
- Supporting employers;
- Simplifying the skills system; and
- Strengthening partnerships.

## Population, Economics and Skills

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### Wales

The ***Well-being of Future Generations (Wales) Act 2015*** is focused on improving the social, economic, environmental and cultural well-being of Wales. The Act requires the public bodies listed in the Act to ensure that any action or process they carry out is done in a sustainable way, must maximise its contribution to well-being goals, and that when making decisions they take into account the impact those decisions could have on people living their lives in Wales in the future. The Act establishes seven well-being goals:

- a prosperous Wales;
- a resilient Wales;
- a healthier Wales;
- a more equal Wales;
- a Wales of cohesive communities;
- a Wales of vibrant culture and thriving Welsh language;
- a globally responsible Wales.

All relevant public bodies must take all reasonable steps (in exercising its functions) to meet those objectives.

***Economic renewal: a new direction (2010)*** sets out the role that devolved government, in this case Wales, can play in providing the best conditions and framework to enable the private sector to grow and flourish. It is intended that government resources will be targeted at tackling wide systematic issues within the Welsh economy – investing in infrastructure, skills and improving the conditions within which businesses operate. Economic renewal will see a fundamental shift away from direct and generic support for companies to a focus on creating the right environment for businesses to succeed.

The ***Wales Infrastructure Investment Plan (2012)*** is intended to drive collaboration, increase visibility and deliver the strategic capital investment decisions. It notes that, infrastructure investment is one of its highest priorities and provides a much needed stimulus, creating the conditions for sustainable growth in the medium and longer term. The Plan is designed to prioritise, scope and coordinate delivery of our major infrastructure investments, whilst improving the long-term economic, social and environmental wellbeing of people and communities in Wales.

***Taking Wales Forward 2016-2021 (2016)*** sets out the Welsh Government's programme to drive improvement in the Welsh economy and public services, delivering a Wales which is prosperous and secure, learning and connected. It includes support for businesses, the creation of apprenticeships and employability support.

The Welsh Government's ***Policy statement on skills (2014)*** sets out future policy actions which will enable Wales to evolve into a highly skilled nation. It is focused on employment and skills and covers four priority areas: skills for jobs and growth; skills that respond to local needs; skills that employer's value; and skills for employment. The objective of the statement is to create the right conditions for employers across Wales to thrive and prosper.

***Cymraeg 2050: A Million Welsh Speakers*** is the Welsh Ministers' strategy for the promotion and facilitation of the use of the Welsh language. It is based around the three themes of

1. increasing the number of Welsh speakers;
2. increasing the use of Welsh; and
3. creating favourable conditions – infrastructure and context.

## Population, Economics and Skills

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The strategy aims to achieve this via several actions including making rapid progress to expand Welsh-medium early years provision by 150 nursery groups over the next decade, increasing the proportion of each school year group receiving Welsh Medium education from 22 percent to 40 percent by 2050 and reviewing the legislation that underpins the Welsh language

**Planning Policy Wales (9<sup>th</sup> Edition, 2016)** sets out that the planning system should support economic and employment growth alongside social and environmental considerations within the context of sustainable development. To this end, the planning system, including planning policies, aims to ensure that the growth of output and employment in Wales as a whole is not constrained by a shortage of land for economic uses. Local planning authorities should aim to facilitate the provision of sufficient land required by the market, except where there are good reasons to the contrary, and with due regard to sustainable development. Planning Policy Wales contains sections on the following topics: planning for sustainability; conserving and improving natural heritage and the coast; the historic environment; economic development; transport; housing; planning for retail and commercial development; tourism, sport and recreation; infrastructure and services; minimising and managing environmental risks and pollution; and minerals.

The **Wales Spatial Plan: Places, Futures (2008)** contains the following key themes which relate to population:

- building sustainable communities;
- promoting a sustainable economy; and
- respecting distinctiveness.

The **Vibrant and Viable Places: New Regeneration Framework (2013)** sets out the vision that everybody in Wales should live in well-connected vibrant, viable and sustainable communities with a strong local economy and good quality of life. The framework sets key priorities for regeneration investment in Wales.

**Technical Advice Note 6 – Planning for Sustainable Rural Economies (2010) (TAN6)** provides practical guidance on how the planning system can support sustainable rural communities. This guidance provides advice on: sustainable rural communities and economies; rural affordable housing; rural enterprise dwellings; one planet developments; sustainable rural services; and sustainable agriculture.

**Technical Advice Note 12 – Design (2016) (TAN12)** sets out the Welsh Government's policies and objectives in respect of the design of new development, including; ensuring attractive, safe public spaces and ensuring ease of access for all.

**Technical Advice Note 13 – Tourism (1997) (TAN13)** offers advice on hotel development, holiday and touring caravans and seasonal and holiday occupancy conditions. Tourism makes a major contribution to the Welsh economy and provides employment in a wide variety of occupations and can bring benefits to local communities in urban and rural areas.

**Technical Advice Note 20 – Planning and the Welsh Language (2013) (TAN20)** provides advice on the consideration of the Welsh language as part of the Local Development Plan making process. The TAN covers: the role of single integrated plans; the Welsh language and sustainability appraisals; the Welsh language commissioner; and signs and advertisements.

**Technical Advice Note 23 – Economic Development (2014) (TAN23)** is intended to help local planning authorities and developers implement national planning policy on economic development. TAN23 provides advice on the national planning policy on economic development set out in Planning Policy Wales. It provides guidance on: developing high level economic planning objectives; assessing the economic benefits of new development; economic development and the rural economy; preparing an evidence base for a Local



## Population, Economics and Skills

Development Plan; creating an economic development vision for a Local Development Plan; and determining employment land supply.

## 2.3 Overview of the Baseline

### UK

#### Demographics

In mid-2016, the resident population of Great Britain was 65,640,100, representing a gain of 538,100 (0.8%) over the previous year (this growth was similar to the average annual increase seen over the last decade). A total of 63.5% of the population was of working age (aged 16 to 64)<sup>49</sup>. The UK's population has increased by over 6 million since 2000<sup>50</sup>.

The working age population for the period April 2017 to June 2017 for the UK was broken down as follows<sup>51</sup>:

- 78.7% economically active, comprising:
  - ▶ 75.1%<sup>52</sup> in employment; and
  - ▶ 4.4%<sup>53</sup> unemployed.
- 21.3% economically inactive.

Since January to March 2016, there was a 0.6% increase with regard to those in the working age population who were economically active, a 1.5% increase in employment and 1.1% reduction in those who are unemployed.

#### Education and Skills

The breakdown of qualifications of the working age population in 2016 was as follows:

- 38 % had NVQ4<sup>54</sup>;
- 17.1 % had NVQ3<sup>55</sup>;
- 3.1% had trade apprenticeships;
- 15.9 % had NVQ2<sup>56</sup>;
- 10.9 % had NVQ1<sup>57</sup>;
- 6.6 % had other qualifications; and

<sup>49</sup> ONS (2017) *United Kingdom population mid-year estimate*. Available online at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/timeseries/ukpop/pop>

<sup>50</sup> NOMIS (2016) *Population estimates - local authority based by five-year age band*. Available online at:

<https://www.nomisweb.co.uk/query/select/getdatasetbytheme.asp?opt=3&theme=&subgrp>

<sup>51</sup> NOMIS (2016) *Labour Market Profile*. Available online at:

<https://www.nomisweb.co.uk/reports/lmp/gor/contents.aspx>

<sup>52</sup> % are for those aged 16-64

<sup>53</sup> % is a proportion of economically active

<sup>54</sup> HND, Degree and Higher Degree level qualifications or equivalent

<sup>55</sup> 2 or more A levels, advanced GNVQ, NVQ 3, 2 or more higher or advanced higher national qualifications (Scotland) or equivalent

<sup>56</sup> 5 or more GCSEs at grades A-C, intermediate GNVQ, NVQ 2, intermediate 2 national qualification (Scotland) or equivalent

<sup>57</sup> Fewer than 5 GCSEs at grades A-C, foundation GNVQ, NVQ 1, intermediate 1 national qualification (Scotland) or equivalent.

## Population, Economics and Skills

- 8.3 % have no qualifications.

In 2015/2016, the UK had a total of 32,142 schools, comprising:

- 3,007 nursery;
- 20,954 primary;
- 7 middle;
- 4,169 secondary;
- 2,391 non-maintained mainstream;
- 1,261 special; and
- 353 pupil referral units<sup>58</sup>.

### Economic Baseline

In 2015, UK per capita Gross Value Added (GVA) was £25,601<sup>59</sup>. The 2015 headline estimates show that both total GVA and GVA per head at current basic prices have increased in all UK regions since 2014. In 2014, London had the highest GVA per head at £43,629 while Wales had the lowest at £18,002.

In April 2016, median gross weekly earnings for full-time employees were £539, up 2.2% from £527 in 2015. The 2.2% growth seen this year is the joint highest growth in earnings seen since the economic downturn in 2008 (matching that seen in 2013)<sup>60</sup>.

In the period April to June 2017, the UK had a total of 32,073,000 people in employment aged 16 and over, 125,000 more than for January to March 2017 and 338,000 more than for a year earlier<sup>61</sup>. The number of people employed in the private sector increased across the year by 391,000 to reach 26.53 million, while the number of people employed in the public sector fell by 20,000 to 5.42 million.

Employment in the mining, energy and water supply sector stood at 538,000 in April-June 2016, an increase of 20,000 from the same period the year previously and an increase of 74,000 since 2007<sup>62</sup>.

Relating specifically to the water industry alone, which is made up of the regulated water utility companies, non-regulated subsidiary water companies (e.g. involved in construction, engineering, consultancy, laboratory services, etc) and the associated supply chain, there were considered to be 166,500 people employed in the industry in 2006. This included 37,000 employed by regulated water companies utilities. A further 65,000 were employed by support services including contractors and consultants and 6,500 self-employed people<sup>63</sup>.

<sup>58</sup> Department for Education (2016) *Education and Training Statistics for the United Kingdom: 2016*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/567215/SR54\\_2016\\_Text.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/567215/SR54_2016_Text.pdf)

<sup>59</sup> Office for National Statistics. *Regional Gross Value Added (income approach): December 2016*. Available online at: <https://www.ons.gov.uk/economy/grossvalueaddedgva/bulletins/regionalgrossvalueaddedincomeapproach/december2016>

<sup>60</sup> ONS (2016) *Annual Survey of Hours and Earnings: 2016 provisional results*. Available online at: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/annualsurveyofhoursandearnings/2016provisionalresults>

<sup>61</sup> ONS (2016) *UK Labour Market: August 2017*. Available online at: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/uklabourmarket/august2017>

<sup>62</sup> Nomis (2017) *EMP13: Employment by industry*. Available online at: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/employmentbyindustrymp13>

<sup>63</sup> *Energy & Utility Skills Sector Skills Agreement: The Water Industry 2006*. Available online at:

## Population, Economics and Skills

UK gross domestic product (GDP) is estimated to have increased by 0.66% in the first quarter of 2017, with GDP 2% higher compared with the same quarter a year ago. Construction industries fell by 0.4% and agriculture by 1.0%, whilst the output of the service industries rose by 0.5% and production by 2.1%<sup>64</sup>.

## England

### Demographics

In mid-2016, England had a resident population of 55,268,100 (49.4% males and 50.6% females) and 63.1% of the population was of working age (aged 16 to 64)<sup>65</sup>. The total resident population accounts for 84% of the UK's population. The population of England increased by 481,800 (0.9%). England's population grew quicker than any other UK country during the year.

In the period, April to June 2017, the working age population breakdown was as follows<sup>66</sup>:

- 79.1% were economically active, comprising:
  - ▶ 75.5%<sup>67</sup> of working age population in employment; and
  - ▶ 4.4%<sup>68</sup> of working age population unemployed.
- 20.9% were economically inactive.

In England, the regional water industry workforce in March 2015 was as follows (change from March 2014 – March 2014 indicated in brackets)<sup>69</sup>:

- North East: 8,000 (+14.3%)
- North West: 24,000 (+9.1%)
- Yorkshire and the Humber: 16,000 (No change)
- East Midlands: 18,000 (+5.9%)
- West Midlands: 18,000 (+5.9%)
- East of England: 17,000 (-5.6%)
- London: 17,000 (-15.0%)
- South East: 28,000 (+3.7%)
- South West: 16,000 (-5.9%)

<https://www2.warwick.ac.uk/fac/soc/ier/ngrf/lmifuturetrends/sectorscovered/energy/sectorinfo/subsectors/>

<sup>64</sup> ONS (2017) *Gross domestic product*. Available online at:

<http://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/grossdomesticproductpreliminaryestimate/aprtojune2016>

<sup>65</sup> ONS (2016) *Population Estimates for UK, England and Wales, Scotland and Northern Ireland: mid-2016*. Available online at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2015#main-points>

<sup>66</sup> NOMIS (2017) *Labour Market Profile*. Available online at:

<https://www.nomisweb.co.uk/reports/lmp/gor/contents.aspx>

<sup>67</sup> % are for those aged 16-64

<sup>68</sup> % is a proportion of economically active

<sup>69</sup> Hope Spring (2015) *UK household water consumption 2015: facts and figures*. Available online at:

<https://www.hopespring.org.uk/uk-household-water-consumption-2015-facts-figures/>

## Population, Economics and Skills

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### Education and Skills

The working age population in 2016 had the following qualifications:

- 37.9% had NVQ4;
- 17.4% had NVQ3;
- 16% had NVQ2;
- 11.6% had NVQ1;
- 6.7% had other qualifications;
- 3% had trade apprenticeships; and
- 7.8% had no qualifications.

In January 2017, England had 24,281 schools, comprising:

- 402 nursery;
- 16,786 primary;
- 3,408 secondary;
- 2,297 independent;
- 1,037 special; and
- 351 pupil referral units.

As of January 2017, there was total of 8.67 million pupils enrolled in schools in England. The total number of pupils has grown each year since 2009, and there are now over half a million more pupils in schools than at that point. Just over 3 million of the school pupils attend academies and free schools<sup>70</sup>.

### Economic Baseline

In 2015, England's per capita GVA was £26,159, which represents a 3% increase on 2014. England accounts for 86% of the UK's total GVA<sup>71</sup>.

In 2016, the median full-time gross hourly pay in England was £13.73 (male median being £14.35 and the female median being £12.89).

In April to June 2017, England had an unemployment rate of 4.4% (people aged 16 and over). This compares to same period in the previous year when the unemployment rate stood at 4.9%<sup>72</sup>.

### Deprivation

In England, 61% of local authority districts contain at least one of the most deprived neighbourhoods in England, according to the 2015 Index of Multiple Deprivation. Middlesbrough, Knowsley, Kingston upon Hull, Liverpool and Manchester are the local authorities with the highest proportions of neighbourhoods

<sup>70</sup> Department for Education (2017) *Schools, pupils and their characteristics: January 2017*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/623124/SFR28\\_2017\\_Main\\_Text.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/623124/SFR28_2017_Main_Text.pdf)

<sup>71</sup> ONS (2016) *Regional gross value added (income approach), UK: 1997 to 2015*. Available online at:

<https://www.ons.gov.uk/economy/grossvalueaddedgva/bulletins/regionalgrossvalueaddedincomeapproach/december2016>

<sup>72</sup> NOMIS (2017) *Labour market profile – England*. Available online at:

<https://www.nomisweb.co.uk/reports/lmp/lor/2092957699/report.aspx>

## Population, Economics and Skills

among the most deprived in England. On average, 37% of the population in the most deprived areas were income deprived. 83% of neighbourhoods that are the most deprived in 2015 were also the most deprived in 2010<sup>73</sup>.

Research by the Consumer Council for Water in 2015 revealed that 12% of customers said they were struggling to pay their water bills, disproportionately affecting those on low incomes. This is evidenced by the fact that total unpaid bills have increased from £1.9 billion to £2.2 billion in the four years between 2010-11 and 2014-15 (2014-15 prices). 23% of households in England spend more than 3% of their income on water and 11% of households spend more than 5% of their income on water. To address this, water companies have put a range of practices in place including<sup>74</sup>:

- promoting assistance schemes;
- establishing social tariffs;
- engaging with local communities and debt advice charities;
- reviewing their communications methods;
- managing debt; and
- training their staff.

## Scotland

### Demographics

In mid-2016, Scotland had a resident population of 5,404,700 (48.6% male and 51.4% female) and 64.6% of the population was of working age (aged 16 to 64). The population grew by 31,700 since mid-2015 (increase of 0.6%), and accounts for 8.2% of the UK's population<sup>75</sup>.

In the period, April to June 2017, the working age population breakdown was as follows<sup>76</sup>:

- 78.2% were economically active, comprising:
  - ▶ 75.2%<sup>77</sup> of working age population were in employment; and
  - ▶ 3.9%<sup>78</sup> of working age population were unemployed.
- 21.8% were economically inactive.

<sup>73</sup> DCLG (2015) *The English Indices of Deprivation 2015*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/465791/English\\_Indices\\_of\\_Deprivation\\_2015\\_-\\_Statistical\\_Release.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/465791/English_Indices_of_Deprivation_2015_-_Statistical_Release.pdf)

<sup>74</sup> Ofwat (2015) *Affordability and debt 2014-15*. Available online at:

[www.ofwat.gov.uk/publication/affordability-and-debt-2014-15](http://www.ofwat.gov.uk/publication/affordability-and-debt-2014-15)

<sup>75</sup> ONS (2017) *Population Estimates for UK, England and Wales, Scotland and Northern Ireland: mid-2016*

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesscotlandandnorthernireland>

<sup>76</sup> NOMIS (2017) *Labour Market Profile - Scotland*. Available online at:

<https://www.nomisweb.co.uk/reports/lmp/gor/contents.aspx>

<sup>77</sup> % are for those aged 16-64

<sup>78</sup> % is a proportion of economically active

## Population, Economics and Skills

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### Education and Skills

The working age population in 2016 had the following qualifications:

- 43.7% had NVQ4;
- 14.1% had NVQ3;
- 13.4% had NVQ2;
- 8.6% had NVQ1;
- 6.1% had other qualifications;
- 4.3% had trade apprenticeships; and
- 9.9% had no qualifications.

In April 2016, Scotland had 2,528 local authority schools<sup>79</sup>, comprising:

- 2,034 primary;
- 359 secondary; and
- 135 special.

### Economic Baseline

In 2015, Scotland's per capita GVA was £23,685. This represents a 2.3% increase on 2014. Scotland accounts for 7.6% of the UK's total GVA<sup>80</sup>.

In 2016, the median full-time gross hourly pay in Scotland was £13.50 (male median being £13.85 and the female median being £13.00). This compares to £13.39 in 2015.

In March to May 2017 Scotland had an unemployment rate of 3.8% (people aged 16 and over). This compares to the same period in the previous year when the unemployment rate stood at 4.6%<sup>81</sup>.

### Deprivation

The Scottish Index of Multiple Deprivation (SIMD) 2016 shows that the pattern of multiple deprivation in Scotland has changed over time, with 11 council areas having a larger share of the 20% most deprived data zones in Scotland compared with SIMD 2012, while ten council areas had a smaller share. There are, however, deep-rooted areas of deprivation, most notably in Glasgow City, which have been consistently among the 5% most deprived in Scotland since SIMD 2004. Glasgow City also has the highest proportion of the most deprived data zones within its area, with almost half of its data zones being in the 20% most deprived. This is followed by Inverclyde, West Dunbartonshire, North Ayrshire and Dundee City<sup>82</sup>.

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<sup>79</sup> Scottish Government (2016) *School Estates 2016 Supplementary Dataset*. Available online at:

<http://www.gov.scot/Topics/Statistics/Browse/School-Education/schoolestatestats/schestate2016>

<sup>80</sup> ONS (2016) *Regional gross value added (income approach), UK: 1997 to 2015*. Available online at:

<https://www.ons.gov.uk/economy/grossvalueaddedgva/bulletins/regionalgrossvalueaddedincomeapproach/december2016>

<sup>81</sup> NOMIS (2017) *Labour Market Profile - Scotland*. Available online at:

<https://www.nomisweb.co.uk/reports/lmp/gor/2013265931/report.aspx>

<sup>82</sup> Scottish Government (2016) *The Scottish Index of Multiple Deprivation*. Available online at:

<http://www.gov.scot/Topics/Statistics/SIMD>

## Population, Economics and Skills

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### Wales

#### Demographics

In mid-2016, the resident population of Wales was 3,113,200 (49.3% males and 50.7% females) and 61.7% of the population were of working age<sup>83</sup>. The population grew by 14,100 (an increase of 0.45%) from mid-2015, an account for 5% of the UK's population<sup>49</sup>.

In the period, April to June 2017, the working age population was broken down as follows<sup>84</sup>:

- 76.2% economically active, comprising:
  - ▶ 72.7%<sup>85</sup> in employment; and
  - ▶ 4.5%<sup>86</sup> unemployed.
- 23.8% were economically inactive.

#### Education and Skills

The working age population in 2015 had the following qualifications:

- 35.1% NVQ4;
- 17.6% NVQ3;
- 17.6% NVQ2;
- 10.9% NVQ1;
- 6.1% other qualifications;
- 3.2% trade apprenticeships; and
- 9.6% no qualifications.

In January 2017, Wales had 1,617 schools<sup>87</sup> comprising:

- 11 nursery;
- 1,2870 primary;
- 10 middle;
- 200 secondary;
- 39 special; and
- 70 independent.

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<sup>83</sup> ONS (2017) *Population Estimates for UK, England and Wales, Scotland and Northern Ireland: mid-2016*

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/datasets/populationestimatesforukenglandandwalesandscotlandandnorthernireland>

<sup>84</sup> NOMIS (2017) *Labour Market Profile - Wales*. Available online at:

<https://www.nomisweb.co.uk/reports/lmp/qr/2013265930/report.aspx>

<sup>85</sup> % are for those aged 16-64

<sup>86</sup> % is a proportion of economically active

<sup>87</sup> Welsh Government (2016) *Schools' Census Results*. Available online at:

<http://gov.wales/statistics-and-research/schools-census/?lang=en>



## Population, Economics and Skills

### Economic Baseline

In 2015, Wales' per capita GVA was £18,002, an increase of 3% compared to 2014. Wales accounts for 3.3% of the UK's total GVA<sup>88</sup>.

In 2016, the median full-time gross hourly pay in Wales was £12.66 (the male median being £13.04 and the female median being £12.01). This compares to £12.00 in 2015.

In the period, April to June 2017, Wales had an unemployment rate of 4.5% (people aged 16 and over). This shows an increase from the previous year when it had an unemployment rate of 4.3%<sup>89</sup>.

### Deprivation

In the Welsh Index of Multiple Deprivation (WIMD) 2014 (revised in 2015), there were pockets of high relative deprivation in the South Wales valleys and large cities, and in some North Wales coastal and border towns. The overall picture is similar to that of WIMD 2011, with six of the ten most deprived areas from WIMD 2011 remaining in the ten most deprived areas in WIMD 2014. The local authority with the highest proportion of areas in the most deprived 10 per cent in Wales in WIMD 2014 was Blaenau Gwent (23.4%), while Monmouthshire had no areas in the most deprived 10 per cent<sup>90</sup>.

## 2.4 Summary of Existing Problems Relevant to the Water Resources NPS

The following existing problems for the population, economics and skills topic have been identified:

- There is a broad level of consistency with regard to the qualifications of the working age population in England, Scotland and Wales, with approximately 38% having a NVQ4 or equivalent qualification and above. Scotland has the greatest proportion of the population with this level of qualification (43.7%), while Wales has the lowest (35.1%). In addition, 8.8% have no qualifications and this should be addressed.
- Many people struggle to pay their water bills, with up to 12% of customers reporting that they struggle to pay. This has a disproportionately large effect on vulnerable groups and those on a low income.
- The respective indicators and areas of multiple deprivation in England, Scotland and Wales are similar in that there continues to be deep rooted deprivation in specific areas year after year. That said, there is also some broader variation to the areas of deprivation across the rest of the country. This suggests that the affordability of water bills will remain an issue for certain communities in the UK.

<sup>88</sup> ONS (2016) *Regional gross value added (income approach), UK: 1997 to 2015*. Available online at:

<https://www.ons.gov.uk/economy/grossvalueaddedgva/bulletins/regionalgrossvalueaddedincomeapproach/december2016>

<sup>89</sup> NOMIS (2017) *Official Labour Market Profile - Wales*. Available online at:

<https://www.nomisweb.co.uk/reports/lmp/gor/2013265930/report.aspx>

<sup>90</sup> Welsh Government (2015) *Welsh Index of Multiple Deprivation*. Available online at:

<http://gov.wales/statistics-and-research/welsh-index-multiple-deprivation/?lang=en>

## Population, Economics and Skills

### 2.5 Likely Evolution of the Baseline

#### UK

##### Demographics

The current UK population is generally increasing and is projected to reach 74.3 million by 2039, a rise of 9.7 million people. Assumed net migration accounts for 51% of the projected increase, with natural increase (more births than deaths) accounting for the remaining 49% of growth.

The age structure of the UK population is moving towards an ageing population, with the average (median) age rising from 40.0 years in 2014 to 42.9 by mid-2039. The number of people of State Pension Age and over is projected to increase by 32.7% to 16.5 million by mid-2039, despite increases to State Pension Age. By mid-2039 more than 1 in 12 of the population is projected to be aged 80 or over.

Those aged under 14 is projected to increase from 11.4 million in 2014 to 12.3 million in 2024 and stay at approximately this level for the next 15 years. There are no formal targets for population growth in the UK<sup>91</sup>.

The increase in population is anticipated to increase demand for water resources, particularly in London and the south east where not only is the population expected to increase most rapidly, these areas also experience the highest levels of water stress.

##### Economics

There are current uncertainties over market conditions, and the outlook for growth in the short to medium term has weakened following the UK's vote to leave the European Union. With a fall in the exchange rate and likely rises in inflation, the Bank of England highlights that whilst financial conditions are currently stable, there are a number of possible exit scenarios from the European Union that could test the resilience of the financial system<sup>92</sup>. The Bank of England also notes that if the economy follows a path broadly consistent with the May 2017 central projection, then monetary policy could need to be tightened by a greater extent over the forecast period than is currently expected<sup>93</sup>.

Jobs in the water and energy industries have declined since the 1970s as a result of factors including the decommissioning of coal fired power stations and the privatisation of utilities. However, it is anticipated that jobs in these sectors are estimated to increase by 0.8% between the years 2015 and 2025<sup>94</sup>.

<sup>91</sup> ONS (2015) *National Population Projections: 2014-based Statistical Bulletin*. Available online at: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2015-10-29>

<sup>92</sup> Bank of England (2017) *Financial Stability Report: Executive summary July 2017*. Available online at: <http://www.bankofengland.co.uk/publications/Documents/fsr/2017/fsrjun17sum.pdf>

<sup>93</sup> Bank of England (2017) *Inflation Report May 2017*. Available online at: <http://www.bankofengland.co.uk/publications/Documents/inflationreport/2017/may.pdf>

<sup>94</sup> Price Waterhouse Coopers (2016) *UK Economic Outlook*. Available online at: <https://www.pwc.co.uk/assets/pdf/ukeyo/ukeyo-sectoral-employment-march-2016.pdf>

## Population, Economics and Skills

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### England

#### Demographics

Between 2014 and 2039, the population of England is projected to increase from 54.3 million to 63.3 million, an increase of 16.3%<sup>95</sup>.

#### Economics

England's total GVA growth in 2015 was up 3% from 2014. GVA has risen year on year since 2009, so it could be expected that it will continue to increase in the future, although the rate may slow given the UK outlook<sup>96</sup>. Given the UK trend data for employment in the water sector is currently increasing year-on-year, it is assumed that jobs in the water industry in England are also showing an annual rise.

### Scotland

#### Demographic

Between 2014 and 2039, the population of Scotland is projected to increase from 5.3 to 5.7 million, an increase of 6.6%<sup>97</sup>.

Scotland has a population target of matching the average European (EU15) population growth over the period from 2007 to 2017. In 2014/15, population growth for was higher than that of the EU15 countries. The average annual population growth rates since 2007 for Scotland and the EU15 were 0.5% and 0.4%, respectively<sup>98</sup>.

#### Economics

Scottish GDP grew 0.8% during the first quarter of 2017. The services sector grew by 0.3% and the Production sector by 3.1%. The construction sector contracted by 0.7%. On an annual basis, comparing the latest quarter to the same period in the previous year, Scottish GDP grew by 0.7%.<sup>99</sup>

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<sup>95</sup> ONS (2015) *National Population Projections: 2014-based Statistical Bulletin*. Available online at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2015-10-29>

<sup>96</sup> ONS (2016) *Regional gross value added (income approach), UK: 1997 to 2015*. Available online at:

<https://www.ons.gov.uk/economy/grossvalueaddedgva/bulletins/regionalgrossvalueaddedincomeapproach/december2016>

<sup>97</sup> ONS (2015) *National Population Projections: 2014-based Statistical Bulletin*. Available online at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2015-10-29>

<sup>98</sup> Scottish Government (2017) *Purpose Target: Population*. Available online at:

<http://www.gov.scot/About/Performance/scotPerforms/purposetargets/population>.

<sup>99</sup> Scottish Government (2017) *Scotland's gross domestic product: 1<sup>st</sup> quarter 2017*. Available online at:

<http://www.gov.scot/Topics/Statistics/Browse/Economy/PubGDP/GDP2016Q2>

## Population, Economics and Skills

### Wales

#### Demographic

The population of Wales is projected to increase to 3.3 million by 2039 (a 6.1% increase compared to 3.1 million in 2014)<sup>100</sup>.

#### Economics

When comparing the year ending December 2016 to the year ending December 2015, the Index of Production increased for both Wales (2.9 per cent) and the UK (1.2 per cent). The increase in Wales was largely accounted for by an increase in output in 'Other Manufacturing and Repair' and 'Rubber and Plastics' and 'other Non-metallic Minerals', whilst the increase in the UK was largely accounted for by Electricity, Gas and Water Supply. When comparing the current quarter with the previous quarter, output increased in both Wales and the UK (by 8.8 per cent and 0.4 per cent respectively). The longer term trend for the Index of Construction for Wales shows a 8% increase when comparing the latest four quarters to the previous four quarters<sup>101</sup>.

Welsh total GVA rose by 2.4% from 2013 to 2014, and has risen year on year since 2008<sup>102</sup>. It could be expected that it will continue to increase in the future, although the rate may slow given the weakened growth expectations for the UK.

## 2.6 Assessing Significance

The objectives and guide questions related to population which have been identified for use in the appraisal of the effects of Water Resources NPS proposals and alternatives are set out in **Table 2.1**, together with reasons for their selection.

**Table 2.1 Approach to Assessing the Effects of the Water Resources NPS Proposals on Population, Economics and Skills**

Objective/Guide Question	Reasoning
<b>Objective: To support a strong, diverse and stable economy through the provision of nationally significant water resources infrastructure with opportunities to improve skills and employment, minimise disturbance to local communities and maximise positive social impacts.</b>	<p>The SEA Directive (2001/42/EC) requires that the likely significant effects on population should be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.</p> <p>Growth in the economy would be expected to lead to an increase in demand for water for commercial and industrial purposes and the provision of sustainable water supplies will be essential for this growth. The construction of large scale water resources infrastructure in particular can represent a significant capital investment with the potential to create employment opportunities, deliver supply chain benefits and contribute to skills development in the working</p>

<sup>100</sup> ONS (2015) *National Population Projections: 2014-based Statistical Bulletin*. Available online at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/bulletins/nationalpopulationprojections/2015-10-29>

<sup>101</sup> Welsh Government (2017) *Index of Production for Wales and Index of Construction for Wales: 2016 Quarter 4*. Available online at:

<http://gov.wales/docs/statistics/2017/170427-index-production-construction-quarter-4-2016-en.pdf>

<sup>102</sup> StatsWales (2016) *Gross Value Added by component, Welsh NUTS2 areas*. Available online at:

<https://statswales.gov.wales/Catalogue/Business-Economy-and-Labour-Market/Regional-Accounts/Gross-Value-Added-GDP/gva-by-component-welshnuts2areas-year>

## Population, Economics and Skills

Objective/Guide Question	Reasoning
	population. The inclusion of this AoS objective ensures that these effects can be considered within the AoS.
Will the Water Resources NPS help to ensure that sufficient water resources infrastructure is in place to meet increased demand associated with population growth and to support economic development?	The Environment Agency's 2011 'Case for Change' considered the implications of climate change for water supplies regionally and nationally and concluded that while demand management will have an important role, significant new water resources will be needed to meet the needs of people, businesses and the environment. Water UK's 2016 'Water resources long term planning framework (2015-2065)' noted the importance of strategic schemes. The Government confirmed in its 'Consultation on the Government's Strategic Priorities for Ofwat: Affordable, Resilient Water Supplies' (2017) that a strategic objective for Ofwat is to further a reduction in the long-term risk to water supply resilience from drought and other factors, through a range of measures including new supply solutions.
Will the Water Resources NPS ensure that an affordable supply of water is maintained and vulnerable customers protected?	The Consultation on the Government's Strategic Priorities for Ofwat: Affordable, Resilient Water Supplies (2017) sets out the strategic priorities and objectives for Ofwat and which included a strategic objective for Ofwat to address affordability issues. Research by the Consumer Council for Water in 2015 revealed that 12% of customers said they were struggling to pay their water bills and which disproportionately affects those on low incomes. This is evidenced by the fact that total value of unpaid bills has increased between 2010-11 and 2014-15.
Will the Water Resources NPS promote economically efficient solutions that deliver best value for money?	Ofwat's regulatory duties include promoting economy and efficiency by water companies in their work.
Will the Water Resources NPS affect opportunities for investment in education and skills development?	Investment in education and skills development are vital for economic growth.
Will the Water Resources NPS reduce the effect of water restrictions resulting from droughts on the economy?	Water restrictions have the capacity to affect the productivity of the commercial and industrial sectors, adversely affecting the economy.
Will the Water Resources NPS affect existing abstractors?	The construction of new water resource infrastructure could lead to changes in catchment flows which could affect existing licensed users of water resources.
Will the Water Resources NPS affect the number or types of jobs available in local economies?	Affecting the number or type of jobs will have influences on the local economy and productivity. It is anticipated that a number of jobs may be created during the construction and maintenance phases of any infrastructure built.
Will the Water Resources NPS help to improve the resilience to other national infrastructure?	Much of Britain's key infrastructure is dependent on a reliable source of water. As such, it is important that the benefits that improved water resources infrastructure can have are identified.
Will the Water Resources NPS affect the social infrastructure and amenities available to local communities?	The Water Resources NPS may result in short or medium term changes to population demographics arising from the projects receiving development consent (for example, through in migration of workers skilled to work in the industry, depending on the scale and location of the proposed infrastructure). Changes to local population demographics and employment have the potential to impact on the local economy and demand for community facilities such as healthcare, education and recreation. The potential to impact on the local social infrastructure and amenities which could affect the quality of life of individuals in local communities.

**Table 2.2** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the population objective.

## Population, Economics and Skills

Table 2.2 Illustrative Guidance for the Assessment of Significance for Population, Economics and Skills

Effect	Description	Illustrative Guidance
++	Significant Positive	<ul style="list-style-type: none"> <li>Option would help ensure sufficient water resources infrastructure is in place to meet increased future long term regional demand for water and support economic development;</li> <li>Option would ensure a significant additional regional affordable supply of water is maintained and vulnerable customers protected;</li> <li>Option would incorporate the provision of social infrastructure and amenities;</li> <li>Option would provide educational services/facilities and offer long-term opportunities for skills development including, for example, apprenticeship schemes;</li> <li>Option would generate in the order of 800 or more direct full time equivalent (FTE) employment opportunities per annum<sup>1</sup>, a large proportion of which would benefit the local community;</li> <li>Option would generate significant investment in local supply chains fostering economic growth, generating indirect employment opportunities and enhancing the robustness of the local economy (e.g. through the procurement of local contractors to undertake construction activities);</li> <li>Option would significantly enhance the attractiveness of an area to existing and prospective residents and businesses (e.g. through the generation of employment opportunities).</li> </ul>
+	Positive	<ul style="list-style-type: none"> <li>Option would help ensure water resources infrastructure is in place to contribute towards meeting increased future long term sub-regional demand for water and support economic development;</li> <li>Option would ensure an additional affordable supply of water is maintained and vulnerable customers protected;</li> <li>Option would stimulate some limited investment in existing services and amenities (e.g. associated with any increase in the work place population);</li> <li>Option would provide some educational opportunities and skills development including, for example, apprenticeship schemes;</li> <li>Option would generate some direct full time equivalent (FTE) employment opportunities per annum (below 800) which may benefit the local community;</li> <li>Option would generate some limited investment in local supply chains (e.g. through the procurement of local contractors to undertake construction activities);</li> <li>Option would enhance the attractiveness of an area to existing and prospective residents and businesses (e.g. through the generation of employment opportunities and provision of infrastructure).</li> </ul>
0	Neutral	<ul style="list-style-type: none"> <li>Option would not affect the provision of water resources infrastructure.</li> <li>Option would not affect affordable supplies of water;</li> <li>Option would not affect social infrastructure and amenities available to local communities;</li> <li>Option would not affect the provision of educational services/facilities or offer opportunities for skills development;</li> <li>Option would not affect any local employment opportunities/increase local unemployment rates;</li> <li>Option would have no effect on wider economic benefits/undermine the growth and diversity of the local economy;</li> <li>Option would not affect the attractiveness of an area to existing and prospective residents and businesses.</li> </ul>

## Population, Economics and Skills

Effect	Description	Illustrative Guidance
-	Negative	<ul style="list-style-type: none"> <li>Option would reduce/restrict the provision of water resources infrastructure;</li> <li>Option would adversely affect additional affordable supplies of water;</li> <li>Option would cause some disruption to existing services and amenities available to local communities which is likely to be felt in the short term;</li> <li>Option would lead to a loss of some direct FTE jobs (below 800 per annum) (e.g. due to the cessation of some activities or rationalisation of activities on sites);</li> <li>Option would reduce the resilience and diversity of the local economy (e.g. through loss of local supply chain opportunities);</li> <li>Option would reduce local investment in an area and affect growth of local economy;</li> <li>Option would undermine the attractiveness of an area to existing and prospective residents and businesses (e.g. due to impacts arising from construction activities or concerns regarding operational impacts);</li> <li>Option would undermine the quality of life of the local population (e.g. due to noise and vibration associated with HGV movements during construction or operation) such that some complaints could be expected.</li> </ul>
--	Significant Negative	<ul style="list-style-type: none"> <li>Option would reduce/restrict the provision of nationally significant water resources infrastructure;</li> <li>Option would adversely affect additional affordable regional supplies of water;</li> <li>Option would result in the loss of existing services and amenities available to local communities (e.g. where development is proposed on a site in community use);</li> <li>Option would lead to a significant loss of direct FTE jobs (a minimum of 800 per annum) (e.g. due to the closure of local employment sites);</li> <li>Option would significantly reduce the resilience and diversity of the local economy (e.g. through significant loss of local contracts and supply chain opportunities);</li> <li>Option would lead to a significant reduction in investment in an area that would affect the growth of local economy;</li> <li>Option would significantly undermine the attractiveness of an area to existing and prospective residents and businesses (e.g. due to impacts arising from construction activities or concerns regarding operational impacts);</li> <li>Option would seriously undermine the quality of life of the local population (e.g. due to noise and vibration associated with HGV movements during the construction or operation of facilities) such that the project and local authority would be likely to experience a considerable number of complaints.</li> </ul>
?	Uncertain	<ul style="list-style-type: none"> <li>From the level of information available, the effect that the option would have on this objective is uncertain.</li> </ul>

<sup>1</sup> The proposed threshold of significance represents around 0.5% of the estimated 166,500 jobs supported by the water sector in the UK (<https://www2.warwick.ac.uk/fac/soc/ier/ngrf/lmifuturetrends/sectorscovered/energy/sectorinfo/subsectors/>).

## Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 2.3** presents the appraisal of the likely significant effects of the draft NPS and the and the 'no NPS' reasonable alternative on the population, economics and skills objective. The appraisal considers in-turn the three subsections used for each topic within Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making and Mitigation. The performance of the draft NPS and the two reasonable alternatives are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters



## Population, Economics and Skills

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1 – 3 of the draft NPS outlining how the remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the 'no NPS' reasonable alternative is then summarised along with any proposed mitigation measures.

## Population, Economics and Skills

Table 2.3 Appraisal of the Draft NPS and Reasonable Alternatives: Population, Economics and Skills

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	+	+/?	<p><b>Draft NPS:</b> The text in the draft NPS under 'Applicant's Assessment' states that:</p> <p>4.13.4 "The applicant should consider how the impacts of the infrastructure during the construction and operational phases, such as job creation and increased spending in local economics, visual impacts and traffic and transport may affect local communities and amenities."</p> <p>4.13.5 "Applicants should describe the existing socio-economic conditions, in the areas surrounding the proposed development, following appropriate consultation with those most affected, and should refer to how the development's socio-economic impacts correlate with local planning policies. Applicants should assess any likely, significant positive and negative socio-economic impacts as part of an Environmental Statement."</p> <p>4.13.6 "The assessment should cover any socio-economic impacts appropriate to the proposed development. Examples include:</p> <ul style="list-style-type: none"> <li>the creation of jobs and training opportunities;</li> <li>the provision of educational and visitor facilities;</li> <li>the impact of the proposed new facility on tourism, local businesses or local services;</li> <li>opportunities to provide a direct water supply to local business water users."</li> </ul> <p>4.13.7 "Socio-economic impacts may be linked to other impacts, for example the visual impact or an individual's perception of a development. It may also have an impact on the local economy and local businesses. Where such impacts are relevant to the development, an applicant should include them in their assessments."</p> <p>4.13.8 "Any cumulative effects on communities should be assessed. For example, if development consent, or consent under other regimes, were to be granted for a number of infrastructure projects within a region and these were developed in a similar timeframe; there could be some short-term negative effects. For instance, a potential shortage of construction workers to meet the needs of other industries and major projects within the region."</p> <p>4.13.9 "Applications for reservoirs are required to be supported by a recreational amenities statement outlining details of any amenities to be provided. The statement could use information gathered from sections 4.13 and 3.12 (for example) to justify any associated recreational or educational amenities. The Water Industry Act also places certain duties on water undertakers in relation to the provision of recreational facilities."</p>

## Population, Economics and Skills

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>It is apparent from the above that the draft NPS identifies a broad range of factors to be considered as part of any application for new water resources infrastructure. Overall, it is judged to have a positive effect against this AoS objective.</p> <p><u>Recommendations for improvement</u></p> <p>The draft NPS provides a range of factors to be considered by applicants when undertaking their assessments, which is considered appropriate and relevant. The text on employment could be expanded to explicitly require the assessment of the direct, indirect and induced employment associated with different phases of development, allowing for any negative or positive effects on other parts of the economy, for example tourism. Additionally, this section could specifically refer to impacts on existing abstractors (or any constraints on their future growth arising from the NSIP) as well as community cohesion and disadvantaged areas.</p> <p>This section could make explicit specific reference to delivering socio-economic benefits including, for example, local employment creation (as opposed to the assessment of these impacts).</p> <p>Paragraph 4.13.4 could be revised to state <i>"The applicant should consider how the impacts of the infrastructure during construction and operational phases, such as job creation and increased spending in local economies, visual impacts and traffic and transport may affect local communities and amenities. Applicants should demonstrate that with any water resources infrastructure development, they have taken steps to ensure that the entire demographic, including all equality groups in the local area, is considered"</i>.</p> <p>There is no detailed guidance on the potential contents that should form part of the ES. It would be useful to supplement the current information with equivalent guidance. Specification of the contents of the ES could be drawn from the following which in turn serves as the reference point for the detail of the 'Decision Making' section:</p> <ul style="list-style-type: none"> <li>• Scoping <ul style="list-style-type: none"> <li>○ Identify the likely zone of influence of the proposed infrastructure. This typically includes an identification of possible direct economic and other effects affecting local people in the vicinity, as well as indirect and induced economic effects over a larger area.</li> <li>○ Identify and evaluate the socio-economic characteristics of the population and, where relevant, of businesses likely to be affected (this is expected to include consultation with relevant stakeholders).</li> <li>○ Identify and evaluate features, services and facilities within the zone of influence including education, public health, tourism and recreation.</li> </ul> </li> </ul>

## Population, Economics and Skills

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>○ Describe any future anticipated changes to the above in the absence of the proposed infrastructure, to inform the assessment of impacts, recognising the socio-economic characteristics are inherently dynamic.</li> <li>○ Provide the methodological basis for determining the significance of effects and the scope of effects to be assessed.</li> <li>• Impact assessment <ul style="list-style-type: none"> <li>○ Assess and characterise the impacts and their effects (including scale, duration and significance) outlined in the scoping assessment.</li> <li>○ Assess the residual socio-economic impacts of the project remaining after mitigation and the significance of their effects, including cumulative effects.</li> <li>○ Evaluate avoidance, mitigation, compensation and enhancement measures that may be necessary.</li> </ul> </li> <li>• Avoidance, mitigation, compensation and enhancement <ul style="list-style-type: none"> <li>○ Identify and incorporate measures to avoid, reduce and compensate for social and economic impacts, and where possible enhance beneficial effects identified.</li> <li>○ Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.</li> </ul> </li> <li>• Advice for decision makers: <ul style="list-style-type: none"> <li>○ Provide advice on the consequences for decision making of the significant social and economic impacts.</li> </ul> </li> </ul> <p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and EIA which would require consideration of the effects on population and the community. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on population. In consequence, even without the NPS, this alternative would still be considered to have a positive effect in relation to population, economics and skills. However, the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the NPS) risks inconsistency in interpretation, particularly at a project level which could have more uncertain outcomes (and at least the possibility that all beneficial effects are not enhanced and all adverse effects not avoided, minimised or mitigated).</p>

## Population, Economics and Skills

Draft NPS Section	Draft NPS	No NPS	Appraisal
			Overall, this alternative has been assessed as likely to have a positive effect on the population, economics and skills AoS objective, although a degree of uncertainty persists.
<b>Decision Making</b>	+	+/?	<p><b>Draft NPS:</b> The text in the draft NPS under the heading of the 'Decision Making'; states:</p> <p>4.13.10 "The Secretary of State should consider any relevant provisions the applicant has made or is proposing to make to mitigate impacts (for example through planning obligations), and any community investment that may arise as well as any options for phasing development that would mitigate any socio-economic impacts."</p> <p>4.13.11 "The Secretary of State should ensure that infrastructure projects can be integrated effectively with existing businesses and community facilities. Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new infrastructure projects in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."</p> <p>Overall, it is considered that the draft NPS is likely to have a positive contribution to this objective by setting out a range of factors to be considered in determining an application including an acceptable approach to mitigating equalities impacts.</p> <p><u>Recommendations for Improvements</u></p> <p>None identified.</p> <p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and EIA which would require consideration of the effects on population and the community. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on population. In consequence, even without the NPS, this alternative would still be considered to have a positive effect in relation to population, economics and skills. However, the absence of a clear statement of the full range of considerations to be taken into account by the Secretary of State (as proposed in the NPS) risks inconsistency in interpretation, particularly with regard to the statement in the draft NPS that development consent should only be granted where the measures put forward by the applicant to mitigate any adverse equalities impacts are acceptable would be lost causing come uncertainty.</p>
<b>Mitigation</b>	+	+/?	<p><b>Draft NPS:</b> The text in the draft NPS under 'Mitigation' states that:</p>

## Population, Economics and Skills

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>4.13.12 <i>"The Secretary of State should consider whether the mitigation measures put forward by the applicant are acceptable to mitigate any adverse socio-economic impacts of the development. For example, high quality design and/or screening (e.g. by natural features) can improve the visual and environmental experience for visitors and the local community alike."</i></p> <p>More specific mitigation measures are provided in the 'Introduction' section.</p> <p>Overall, it is considered that the draft NPS makes a positive contribution to this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>To inform the appraisal of this section of the draft NPS, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on population, economics and skills has been undertaken. This review is intended to help identify where any additional measures could be included in the draft NPS (in the introduction or mitigation section of the topic) to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p> <p>The following text identifies the anticipated socio-economic impacts and associated mitigation measures. These have been largely identified within the draft NPS and are discussed again here to ensure that the description of impacts is clear and provides the necessary context for the recommended mitigation measures. Where impacts discussed here have not been included within the draft NPS, they have been clearly identified.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p> <p><i>Construction</i></p> <p>As identified in the draft NPS, the construction or enlargement of new reservoirs would be likely to represent a large capital investment that could have a significant positive impact on the local economy associated with employment opportunities and supply chain benefits generated by the development together with spend by construction workers and contractors. However, construction activity could, depending on the location of development, have adverse impacts on existing nearby businesses and the tourism sector due to, for example, loss of amenity. There is also the potential for an influx of construction workers to host communities to increase pressure on existing services and facilities as well as the local housing market which may affect community cohesion (albeit temporarily).</p> <p>In addition to the effects identified in the draft NPS, depending on the site taken forward for development, land take could directly affect existing land uses such as agriculture, particularly given the area of land likely to be required (in respect of new reservoirs in particular).</p>

## Population, Economics and Skills

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><i>Operation</i></p> <p>As identified in the draft NPS, reservoir development would be anticipated to lead to (albeit minor) job creation during the operational phase associated with the day-to-day operation and maintenance of infrastructure. Reservoir development may provide recreational opportunities such as walking and watersports that could help support local businesses and the tourism sector.</p> <p>In addition to the effects identified in the draft NPS, once operational, a new or enlarged reservoir would be expected to play an important role in providing the water supply needed to support both population and economic growth, helping to ensure that water is available for both private and commercial uses. Enhanced resilience in supply would be expected to reduce the requirements for drought restrictions that can adversely affect the economy.</p> <p><b>Water Transfer Schemes</b></p> <p><i>Construction</i></p> <p>As per the construction impacts for reservoirs.</p> <p><i>Operation</i></p> <p>Impacts on water security and job creation identified in the draft NPS are as per the operational impacts for reservoirs.</p> <p>In addition to the effects identified in the draft NPS, there is a risk that the operation of water transfer schemes could, for the areas of sourced water resources, affect existing abstractors (including proposed future growth) and other receptors using the target supply.</p> <p><b>Desalination</b></p> <p><i>Construction</i></p> <p>As per the construction impacts for reservoirs.</p> <p><i>Operation</i></p> <p>Impacts on water security and job creation identified in the draft NPS are as per the operational impacts for reservoirs</p> <p><b>Potential additional mitigation measures identified through a review draft WRMPs and their associated SEA Environmental Reports include:</b></p>

## Population, Economics and Skills

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>Where possible steps should be taken to minimise the loss of visual amenity and amenity space to minimise the impact on nearby businesses and the tourism sector.</li> <li>Steps should be taken to ensure that local facilities and amenities have sufficient capacity to accommodate any anticipated population growth, particularly during the construction phase.</li> </ul>
			<p><b>No NPS:</b> Under this alternative, socio-economic impacts would be considered in accordance with the EIA Regulations and the broad range of positive effects associated with new water resources infrastructure would occur. However, the opportunity for the NPS to provide clarity and further guidance, would be lost causing some uncertainty within the appraisal of effects against this objective.</p>
<p><b>Other Sections of the Draft NPS Relevant to Population, Economics and Skills</b></p>	<p>The following provides additional commentary on the text in the other sections of the draft NPS relevant to population, economics and skills. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b>1. Introduction</b></p> <p><b>1.1. Background and scope of this NPS</b> – reference to the AoS prepared in support of the draft NPS will help to ensure that the effects on population, economics and skills are given proper consideration, notwithstanding the fact that there remains uncertainty over potential impacts, particularly in respect of the absence of specific locations and likely effects within the draft NPS.</p> <p>With regard to para 1.1.8, there is an opportunity for the consideration of effects on population, economics and skills in a specific locality through the preparation of a local impact report submitted by a local authority in accordance with the Planning Act 2008. There is no prescribed format for local impact reports but there is clearly an opportunity for a local authority to comment on relevant issues, helping to ensure that consideration is given to likely effects in a particular locality.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on population, economics and skills in Scotland and Wales.</p> <p><b>1.3. Infrastructure covered by the Water Resources NPS</b> – as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on population.</p> <p><b>2. Government policy and the need for nationally significant water resources infrastructure</b></p> <p><b>2.2 Pressure on water availability now and in the future</b> – identifies the need to ensure a robust and stable supply of water to meet the increasing demand as a result of both population and economic growth.</p>		



## Population, Economics and Skills

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>2.5. The role of water resource management plan in identifying the need</b> – as noted, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, options will be assessed as a part of the WRMP process for their effects in respect of population. This is reflected in paragraph 2.5.7.</p> <p><b>2.6 The role of nationally significant infrastructure projects</b> – identifies that alongside new reservoirs, new water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP when assessed against the relevant threshold in the Planning Act 2008 or through a section 35 referral. These infrastructure types may have social or economic effects of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p> <p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p><b><u>3. Assessment Principles</u></b></p> <p><b>3.1 General principles of assessment</b> - the provisions of the Planning Act 2008 and the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, provides the starting point for the protection and enhancement of socio-economic related interests.</p> <p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on population.</p> <p><b>3.2 Environmental Impact Assessment</b> – the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that socio-economic interests are fully considered, as will the consideration of cumulative effects and interrelationships between effects.</p> <p>This section specifically highlights that information gathered from the WRMP options assessments and the draft NPS will also be useful to identify the significant effects of a proposed project.</p> <p><b>3.5 Assessing Alternatives</b> – the requirement that reasonable alternatives will need to be considered as part of scheme design and project planning, including as part of the WRMP options appraisal process, should ensure that socio-economic related issues are taken into account, both in terms of protection and opportunities for mitigation and enhancement.</p> <p><b>3.6 Criteria for ‘good design’ for water resources infrastructure</b> – attention to good design principles and implementation will be of benefit to socio-economic interests through the consideration of how a proposed scheme interacts with its context. Good design also provides the opportunity to deliver accessible infrastructure and features that people will want to visit, e.g. a new reservoir.</p>

## Population, Economics and Skills

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<p><b>3.7 Climate Change Adaptation</b> – ensuring that any development is appropriately adapted to future climate change will help avoid socio-economic impacts associated with climate change impacts on operations.</p> <p><b>3.9 Common Law Nuisance and Statutory Nuisance</b> – paragraph 3.9.2 of the draft NPS notes that: “during the examination of an application for development consent for infrastructure covered under this NPS, possible sources of nuisance under section 79(1) of the Environmental Protection Act 1990 should be considered by the Examining Authority. The Examining Authority should also consider how those sources of nuisance might be mitigated or limited so they can recommend appropriate requirements that the Secretary of State might include in any subsequent order granting development consent.” Provisions in relation to statutory nuisance will help ensure that significant effects in relation to socio-economic considerations are avoided.</p> <p><b>3.10 Safety</b> – the draft NPS highlights the role of other safety regimes and the need for the Secretary of State to have regard to health and safety legislation applying to the construction and operation of water resources infrastructure. This primarily relates to the health topic considered elsewhere in this AoS but there are also broader socio-economic benefits to be gained particularly in relation to reducing flood risk, which can have severe consequences for communities and businesses.</p> <p><b>3.12 Health</b> – this section highlights the need for the applicant to consider effects on human health and include measures to avoid, reduce or compensate such impacts as appropriate. This section also highlights the need to consider the potential for cumulative impacts on health by affecting multiple people simultaneously, which in turn can have adverse socio-economic effects.</p>		
<b>Summary Appraisal of Likely Significant Effects</b>	+	+/?	<p><b>Draft NPS:</b> The draft NPS highlights the broad range of issues that will need to be considered under the topic of population, economics and skills and there are also potential synergies between this topic, health and land-use. This has been assessed as having an overall positive effect on this AoS objective.</p> <p>Potential impacts on social infrastructure and amenities available to local communities (both positive and negative) could occur throughout the construction and operation of water resources infrastructure and this is recognised in the ‘Applicant’s Assessment’ section of the draft NPS.</p> <p>There is potential for development to affect local population demographics and levels of deprivation, although it is likely to be primarily incurred during the construction phase of schemes. It is recommended that additional mitigation be added to the draft NPS to ensure that this is appropriately managed.</p> <p>The local economic benefits during the construction phase of water resources infrastructure may be significant, particularly for reservoirs. Therefore, there is an opportunity to ensure that the benefits, including the take up of jobs and investment in local skills and education, are optimised. This is recognised in the draft NPS.</p>

## Population, Economics and Skills

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>There is potential for negative impacts on tourism in the short term as a result of a loss of access to amenity space and/or a loss of visual amenity. Such effects are associated with changed perceptions of an area as a place to live, work or invest. It is recommended that additional mitigation be added to the draft NPS to ensure that this is appropriately managed.</p> <p>It is considered that the draft NPS could be strengthened through the inclusion of specific reference to impacts on existing abstractors.</p>
			<p><b>No NPS:</b> Despite the absence of a guiding framework to consider socio-economic issues, applications would be subject to the provision of national planning policy and EIA Regulations and the resulting overall effects under this alternative are likely to be positive. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on population. However, the absence of clear expectations relating to the scope of assessment and design of infrastructure (including mitigation and enhancement) could lead to uncertainty and inconsistency in their application and missed opportunities for social and economic benefit. The precise range of mitigation applied as part of any scheme development would potentially be less certain and with greater inconsistency than under a NPS.</p>
<b>Summary of Recommended Mitigation and Enhancement</b>	<p>The draft NPS makes a positive contribution to this AoS objective. It identifies a range of issues that should be considered in terms of preparing and determining an application and mitigation. However, section 4.13 of the draft NPS could be enhanced through, in particular:</p> <ul style="list-style-type: none"> <li>• explicitly requiring the assessment of direct, indirect and induced employment;</li> <li>• inclusion of a reference to impacts on existing abstractors as well as community cohesion and disadvantaged areas;</li> <li>• inclusion of specific reference to delivering socio-economic benefits; and</li> <li>• provision of further guidance on the possible contents of an ES.</li> </ul> <p>Additional project-level mitigation for inclusion in the draft NPS is suggested based on a review of draft WRMPs and their associated SEA Environmental Reports. This includes:</p> <ul style="list-style-type: none"> <li>• Additional mitigation could be included to address potential effects on businesses and community facilities particularly during the construction phase.</li> <li>• Where possible, steps should be taken to minimise the loss of visual amenity and amenity space in order to minimise the impact on nearby communities including the business and the tourism sector.</li> </ul>		

## Population, Economics and Skills

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<ul style="list-style-type: none"><li>Steps should be taken to ensure that local facilities and amenities have sufficient capacity to accommodate any anticipated population growth, particularly during the construction phase.</li></ul>		

## Human Health

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# 3. Human Health

## 3.1 Introduction

This section presents the overview of plans, programmes and baseline information for the appraisal of sustainability of the National Policy Statement for Water Resources Infrastructure and reasonable alternatives in respect of human health.

There are links between the human health topic and other topics in the Appraisal of Sustainability (AoS), including population, economics and skills, air quality, noise and water quality.

## 3.2 Review of Plans and Programmes

Clearly, there is a strong link between human health and the availability of potable drinking water. The review of plans and programmes identifies the broad range of plans that seek to promote health and healthy lifestyles. Between them, they identify various factors that contribute to health including the availability of green space and the influence of poor air quality and noise. There is also a recognised need to manage the water environment to ensure that it doesn't pose a health risk.

### International/European

The **Canadian Lalonde Report (1974)** identified four health fields independently responsible for individual health: environment, human biology, lifestyle and health care organisation.

**Health 2020 (2012)** is the WHO's health policy framework for Europe. It aims to support action across government and society to: significantly improve the health and well-being of populations, reduce health inequalities, strengthen public health and ensure people-centred health systems that are universal, equitable, sustainable and of high quality.

The WHO **Children's Environment and Health Action Plan for Europe (CEHAPE) (2004)** was launched at the Fourth Ministerial Conference on Environment and Health in June 2004 and signed by all 53 Member States of the WHO European Region, including the UK. The aim of the CEHAPE is to protect the health of children and young people from environmental hazards. The **Fifth Ministerial Conference on Environment and Health 2010, Parma**, resulted in strengthened commitments to act on children's health and protection from the effects of climate change.

In 2007 the European Commission adopted an overarching Health Strategy **Together for Health - A Strategic Approach for the EU 2008-2013**. The Health Strategy has three strategic objectives: fostering good health in an ageing Europe, protecting citizens from health threats, and supporting dynamic health systems and new technologies. As part of the EU Health Strategy there is a focus on health as a precondition for economic prosperity and the need for smarter investments in health. The Strategy also supports the principle of 'health in all policies', which involves strengthening the integration of health concerns into all policies at Community, Member State and regional levels. An evaluation by the European Commission in 2011 determined that the strategy will remain valid for the next decade and will support the broader Europe 2020 strategy. Europe 2020 aims to turn the EU into a smart, sustainable and inclusive economy promoting growth for all – one prerequisite of which is a population in good health.

The **Third EU Health Programme 2014-2020** is in place to implement the Health Strategy, with objectives to: promote health, prevent diseases, and foster supportive environments for healthy lifestyles; protect

## Human Health

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citizens from serious cross-border health threats; contribute to innovative, efficient and sustainable health systems; and facilitate access to better and safer healthcare for Union citizens.

The Commission published ***Towards Social Investment for Growth and Cohesion 2014-2020 (2013)***, supported by the Commission staff working document ***Investing in Health (2013)***, to show how investing in health contributes towards the Europe 2020 objective of smart, sustainable and inclusive growth.

The **SEA Directive (2001/42/EC)** adopted in 2001 specifically requires the consideration of: “the likely significant effects on the environment, including on issues such as ... human health”. The **SEA Protocol** (United Nations Economic Commission for Europe, 2003), which came into force in 2010, implements the political commitments made at the Third European Conference on Environment and Health and uses the term ‘environment and health’ throughout. It indicates that health authorities should be consulted at the different stages of the process and so goes further than the SEA Directive.

The WHO publication ***Health and Strategic Environmental Assessment (2009)*** provides advice from SEA and health experts on the further involvement of the health sector in SEA and strategic planning processes, in light of the stronger health requirements of SEA set out in the SEA Protocol and the 2004 Fourth Ministerial Conference on Environment and Health.

In the UK, all drinking water, whether from public supplies or other sources, has to meet standards laid down in the **EU Drinking Water Directive (98/83/EC)**. It is the duty of each EU member state government to translate the requirements of the directive into local laws, which must as a minimum meet the requirements of EU legislation. The EU standards are in turn based on advice from the World Health Organization – through the **WHO Guidelines for Drinking Water Quality**, which are regularly updated to take account of new knowledge. The EU Drinking Water Directive also requires the European Commission to review the standards at least every five years in order to take account of changes in the WHO guidelines and current knowledge.

The **Bathing Waters Directive (2006/7/EC)** sets standards for the quality of bathing waters in terms of:

- the physical, chemical and microbiological parameters;
- the mandatory limit values and indicative values for such parameters; and
- the minimum sampling frequency and method of analysis or inspection of such water.

## UK

Many of the national level policies and strategies regarding health are aimed at understanding the trends and nature of health issues within the country, understanding the links between health issues and other related factors (such as economic status, etc.), and, primarily, at reducing the inequalities in health outlooks that are evident between different parts of the country and different sections of the population. Whilst some applicable policies/strategies are contained within adopted strategies, many of the Government’s objectives and intended actions are contained within White Papers and guidance papers.

The Health Protection Agency (now part of Public Health England) published ***A Children’s Environment and Health Strategy for the United Kingdom (2009)*** to meet the UK commitments to the WHO’s CEHAPE, and provides recommendations to the UK Government as to how it best can meet its commitment to the CEHAPE.

The **Water Industry Act 1991** sets out the main powers and duties of the water and sewerage companies and defines the powers of the then Director General of Water Services (now the Water Services Regulation Authority (Ofwat)).

## Human Health

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The Water Industry Act 1999 made several important amendments to the Water Industry Act 1991. These included:

- removing a company's right to disconnect domestic customers for non-payment of bills;
- limiting the circumstances in which companies can start charging domestic customers on a metered basis; and
- securing that companies could continue to charge customers on the basis of rateable value.

The **Water Act 2003** amended the framework for abstraction licensing, made changes to the corporate structure of economic regulation, and extended the scope for competition in the industry to large users.

The **Water Act 2014** enabled greater competition for non-household customers (expected to be limited to customers of English water companies) and gave Ofwat new powers to make rules about charges and charges schemes, as well as making provisions for flood insurance and drainage boards.

The **Water Supply (Water Quality) Regulations 2016** consolidate legislation concerning the quality of water supplies for human consumption in England. The regulations also apply to supplies in Wales where the water undertaker or licensee is primarily based in England.

The **Water Quality and Supply (Fees) Order 2016** sets out the fees that the Chief Inspector of Drinking Water may charge relevant water suppliers for the exercise of functions performed by an inspector. These functions include checking water sampling and analysis and water supply management arrangements and investigating events, incidents, emergencies or other matters arising from the quality or quantity of water.

## England

In England, the Department of Health is the government department responsible for public health issues. Its work includes setting national standards, shaping the direction of health and social care services and promoting healthier living.

The Government's White Paper **Healthy Lives, Healthy People: Our strategy for public health in England (2010)** recognises that the quality of the environment, including the availability of green space and the influence of poor air quality and noise, affects people's health and wellbeing. It detailed plans for a shift of power to local communities, including new duties and powers for local authorities to improve the health of local people.

In April 2013 (enacted by changes to the **National Health Service Act 2006** made by the **Health and Social Care Act 2012**), unitary and upper tier local authorities took over a range of public health activity and as part of this reform the post of Director of Public Health (DoPH) was created. The role of the DoPH is to influence local services, for example joining up activity and services to improve public health.

Public Health England's **From Evidence into Action: Opportunities to Protect and Improve the Nation's Health (2014)** sets out seven health priorities for England for the next five years, namely tackling obesity; reducing smoking; reducing harmful drinking; ensuring every child has the best start in life; reducing dementia risk; tackling antimicrobial resistance; and reducing tuberculosis.

The NHS **Five Year Forward View (2014)** sets out the vision for an improved NHS to address changing health needs and demographics. This includes action on prevention of avoidable illnesses, empowering patients and engaging communities.

The **National Planning Policy Framework (MHCLG, 2018)** sets out the core land use planning principles that should underpin both plan-making and decision taking. It includes a focus on developing healthy communities and states that the planning system can "play a role in creating healthy, inclusive communities

## Human Health

and facilitating social interaction". The **Planning Practice Guidance (DCLG, 2014)** relating to health and wellbeing requires local planning authorities to "ensure that health and wellbeing, and health infrastructure are considered in local and neighbourhood plans and in decision making."

**A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)** includes actions to help people 'connect with the environment to improve health and wellbeing'. Measures identified include helping people to improve their health and wellbeing by using green spaces, encouraging children to be close to nature, with particular focus on disadvantaged areas, and creating green infrastructure within towns and cities.

### Scotland

The **Public Health etc. (Scotland) Act 2008** provides legislation for public health enabling Scottish Ministers, health boards and local authorities to better protect public health in Scotland. The Act defines "protecting public health" to mean protecting the community or any part of it from (i) infectious diseases, (ii) contamination, or (iii) other such hazards which constitute a danger to human health. Guidance has been produced to support the implementation of the Act including in respect of statutory nuisances.

Scottish Government's **2020 Vision (2011)** sets out its strategic vision for achieving sustainable quality in the delivery of healthcare services across Scotland, in the face of the significant challenges of Scotland's public health record, its changing demography and the economic environment. The **Healthcare Quality Strategy for NHS Scotland (2010)** aims to support "everyone in Scotland to live longer healthier lives and to participate more productively both economically and socially".

The Scottish Government's **Scottish Planning Policy (2014)** sets out how the planning system can help deliver more vibrant, successful and sustainable places, of which the choice to "live more active, engaged, independent and healthy lifestyles" is a key deliverable. The document also aims to tackle health and social problems and improve the health and well-being of people.

The **National Planning Framework (NPF 3, 2014)** for Scotland, as part of its vision, aims to enhance the health and well-being of people through promotion of sustainable transport and strengthening environmental and landscape quality.

### Wales

The White Paper **Sustainable Social Services for Wales: A Framework for Action (2011)** highlighted a number of challenges faced by public services in Wales including demographic changes, increased expectations from those who access care and support as well as continuing hard economic realities. The **Social Services and Well-being (Wales) Act 2014** provides the legal framework for improving the well-being of people who need care and support, and carers who need support and to transform social services in Wales. It is based on the principles of well-being, people, partnership and prevention.

The **Well-being of Future Generations (Wales) Act 2015** includes 'a healthier Wales' as one of the seven well-being goals. This is supported by the National Indicators for Wales **How to Measure a Nation's Progress? (2016)** which specifies indicators relating to birth weight, healthy life expectancy, and healthy lifestyle behaviours for adults and children. **Together for Health (2011)** is a five-year vision for NHS Wales, based around community services and placing prevention, quality and transparency at the heart of healthcare. **Working Differently – Working Together (2012)** sets out key objectives, including to develop a workforce aligned and committed to the Together for Health vision and to create a sustainable and skilled workforce that focuses on helping the people of Wales.



## Human Health

Public Health Wales's Strategic Plan for 2015-18, ***Creating a Healthier, Happier and Fairer Wales for Everyone***, sets priority areas for Wales including children's start in life, making healthy choices, and health threats such as infections and air pollution.

***Planning Policy Wales (PPW Edition 9) (2016)*** states the planning policies and proposals should contribute towards the protection and, where possible, the improvement of people's health and well-being. One of the main outcomes of the PPW is to ensure a strong, healthy and just society linked to the contribution of the well-being goals.

### 3.3 Overview of the Baseline

#### UK

In the UK, life expectancy at birth during the period 2013-2015 was 79.1 years for males and 82.8 years for females<sup>103</sup>.

In England and Wales, cancer accounted for 28.5% of all deaths registered in 2016 and remained the most common broad cause of death for both men and women (30.8% of all male deaths and 26.2% of all female deaths registered in 2016). There have been fairly steady decreases in age-standardised mortality rates for the three main broad disease groups (cancer, respiratory and circulatory diseases) over the last decade. The overall rates for cancer decreased by 0.5% compared to 2015, however for females they increased by 0.1%. Death rates from respiratory diseases (including influenza, pneumonia, chronic lower respiratory disease, bronchitis, emphysema and other chronic obstructive pulmonary diseases and asthma) are higher in the UK at 138.3 per 100,000 population than in any other EU Member State. In the UK, in 2016, there were 161.9 deaths per 100,000 males and 114.7 deaths per 100,000 females from respiratory diseases, compared to an EU average of 117.3 deaths per 100,000 males and 63.0 deaths per 100,000 females<sup>104,105</sup>. Circulatory diseases, such as heart disease and stroke remained the second most common broad cause of death, accounting for just over a quarter (25.5%) of all deaths registered in 2016. Mortality rates for circulatory diseases decreased compared to 2015 and are now lower than in 2014 for both males and females<sup>106</sup>.

In 2013, more than one in three adults in Great Britain reported having a long-standing illness or disability, this increased slightly compared with 2012 but was in line with the levels seen between 2005 and 2012. One in five reported having a limiting long-standing illness or disability<sup>107</sup>.

<sup>103</sup> ONS (2016) *National life tables, UK: 2013–2015*. Available online at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/bulletins/nationallifetablesunitedkingdom/20132015>

<sup>104</sup> Eurostat (2016) *Causes of Death Statistics*. Available online at:

[http://ec.europa.eu/eurostat/statistics-explained/index.php/Causes\\_of\\_death\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Causes_of_death_statistics)

<sup>105</sup> ONS (2017) *Deaths registered in England and Wales 2016*. Available online at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/deathsregistrationsummarytables/2016>

<sup>106</sup> ONS (2017) *Deaths registered in England and Wales 2016*. Available online at:

<http://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/deathsregisteredinenglandandwalesseriesdr/2015-11-09>

<sup>107</sup> ONS (2015) *Adult Health in GB, 2013*. Available online at:

<http://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandlifeexpectancies/compendium/opinionsandlifestylesurvey/2015-03-19/adulthealthgreatbritain2013>

## Human Health

There are high levels of hypertension and overweight/obesity in the UK<sup>108</sup>. Public health trends often correlate with deprivation and these figures for illness are invariably far less favourable in deprived areas<sup>109</sup>.

The quality standards for the UK's public water supply are laid down in national regulations derived from the EU Drinking Water Directive (as noted above). These standards are based on advice from the World Health Organization (WHO) and are regularly reviewed. Water quality is also checked and regulated by independent drinking water inspectorates in England and Wales, Scotland and Northern Ireland, who report each year. The latest figures for drinking water quality compliance are:

- England and Wales 99.96% (reported July 2017);
- Scotland 99.91% (reported August 2017); and
- Northern Ireland 99.83% (reported November 2016).

Water in rivers can be carriers or vectors of disease. The most commonly incurred water borne diseases in the UK include:

- Leptospirosis;
- Cryptosporidiosis;
- E coli;
- Hepatitis A / C; and
- Botulism.

In the UK, 96.8% of bathing waters met the mandatory water quality in 2016. Between 2015 and 2016, 16 UK sites improved from poor to sufficient<sup>110</sup>. Further information on bathing water quality is provided in **Section 5**.

## England

In England, life expectancy at birth during the period 2013-2015 was 79.4 years for males and 83.1 years for females.

In 2011, 47.2% of the population in England rated their health as very good; 34.2% as good, 13.1% as fair, 4.2% as bad and 1.2% as very bad<sup>111</sup>.

The 2014 Health Survey for England, published in 2015, sets out the following key findings<sup>112</sup>:

<sup>108</sup> Health and Social Care Information Centre (2015) *Health Survey for England 2014: Trend Tables Commentary*. Available online at: <http://content.digital.nhs.uk/catalogue/PUB19297/HSE2014-Trend-commentary.pdf>

<sup>109</sup> ONS (2013) *General Health in England and Wales: 2011 and comparison with 2001*. Available online at: <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandwellbeing/articles/generalhealthinenglandandwales/2013-01-30>

<sup>110</sup> European Environment Agency (2016). *State of Bathing Water*. Available online at: <https://www.eea.europa.eu/themes/water/status-and-monitoring/state-of-bathing-water>

<sup>111</sup> ONS (2013) *General Health in England and Wales: 2011 and comparison with 2001*. Available online at: <https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/healthandwellbeing/articles/generalhealthinenglandandwales/2013-01-30>

<sup>112</sup> Health and Social Care Information Centre (2015) *Health Survey for England 2014: Trend Tables Commentary*. Available online at: <http://content.digital.nhs.uk/catalogue/PUB19297/HSE2014-Trend-commentary.pdf>

## Human Health

- Overall, 11% of men and 13% of women aged 65 and over received help over the last month with at least one of the Activities of Daily Living (ADL) such as having a bath or shower, dressing or undressing and taking medicine.
- Mean BMI for both men and women was 27.2 kg/m<sup>2</sup>, in the overweight range. Around a quarter of adults were obese (24% of men and 27% of women), and 41% of men and 31% of women were overweight.
- 22% of men and 16% of women drank more alcohol than the level considered to be at lower risk of alcohol-related harm.
- 26% of adults reported having ever been diagnosed with at least one mental illness.

### Scotland

In Scotland, life expectancy at birth during the period 2013-2015 was 77.1 years for males and 81.1 years for females<sup>103</sup>.

The 2015 Scottish Health Survey, published in 2016, sets out the following key findings<sup>113</sup>:

- 74% of adults aged 16 and over described their health as 'good' or 'very good'.
- 29% of adults were obese, while 65% were overweight including obese.
- 15% of adults reported ever having been diagnosed with cardiovascular disease (CVD).
- 6% of adults had doctor diagnosed diabetes.
- 29% of adults aged 16 and over had hypertension.

### Wales

In Wales, life expectancy at birth for the period 2013-2015 was 78.4 years for males and 82.3 years for females.

In 2011, 46.6% of the population in Wales rated their health as very good; 31.1% as good, 14.6% as fair, 5.8% as bad and 1.8% as very bad.

The 2015 Welsh Health Survey, published in 2016, includes the following key findings<sup>114</sup>.

- 59% of adults were classified as overweight or obese, including 24% obese.
- 51% of adults reported currently being treated for an illness, 20% of adults currently being treated for high blood pressure, 14% for a respiratory illness, 12% for arthritis, 13% for a mental illness, 8% for a heart condition and 7% for diabetes.
- 33% of adults reported that their day-to-day activities were limited because of a health problem/disability, including 15% who were limited a lot.

<sup>113</sup> Scottish Government (2016) *Scottish Health Survey 2015*. Available online at: <http://www.gov.scot/Resource/0050/00505745.pdf>

<sup>114</sup> Welsh Government (2016) *Welsh Health Survey 2015*. Available online at: <http://gov.wales/statistics-and-research/welsh-health-survey/?lang=en>

## Human Health

### 3.4 Summary of Existing Problems Relevant to the Water Resources NPS

The following existing problems for health have been identified:

- Health inequalities exist in many communities. This is due a number of factors (and the interplay between them) including housing quality, economic wellbeing, employment, lifestyle, heredity factors, cultural and environmental factors.
- At present, respiratory illness places a significant burden on the health service. Sustained exposure to elevated air pollution levels (including exposure to elevated concentrations of particulate matter, oxides of nitrogen and sulphur) contributes to this problem. According to WHO estimates, nearly 500,000 deaths in Europe in 2012 were linked to exposure to outdoor air pollution (WHO 2014)<sup>115</sup>. There is the potential for significant level of dust and other emissions to arise during the construction phase that are related to respiratory illnesses.
- Whilst relatively uncommon, the freshwater environment poses a number of health risks that can be easily exacerbated if the environment is poorly managed.

### 3.5 Likely Evolution of the Baseline

#### UK

Life expectancy<sup>116</sup> at birth in the UK has reached its highest level on record for both males and females. From 1982 to 2015, life expectancy at birth has increased from 70.8 to 79.1 years for males and 76.8 to 82.8 years for females<sup>103</sup>.

Period life expectancy<sup>117</sup> at birth is projected to rise by eight years for males and seven years for females across the 50-year projection period 2014 – 2064. **Figure 3.1** shows period life expectancy at birth for males and females 1981-2014 and then for each of the variant life expectancy projections to 2064. Under the principal projection, a baby boy born in 2064 is projected to live to 87.2 years and a baby girl to 89.8 years. In the high life expectancy variant, period life expectancy at birth is projected to reach age 92.2 and age 94.4 for males and females respectively in 2064, but the low life expectancy variant projects period life expectancy as low as 82.2 and 85.2 respectively<sup>118</sup>.

<sup>115</sup> WHO (2014) *Burden of disease from ambient air pollution for 2012*. Available online at: [www.who.int/phe/health\\_topics/outdoorair/databases/AAP\\_BoD\\_results\\_March2014.pdf?ua=1](http://www.who.int/phe/health_topics/outdoorair/databases/AAP_BoD_results_March2014.pdf?ua=1)

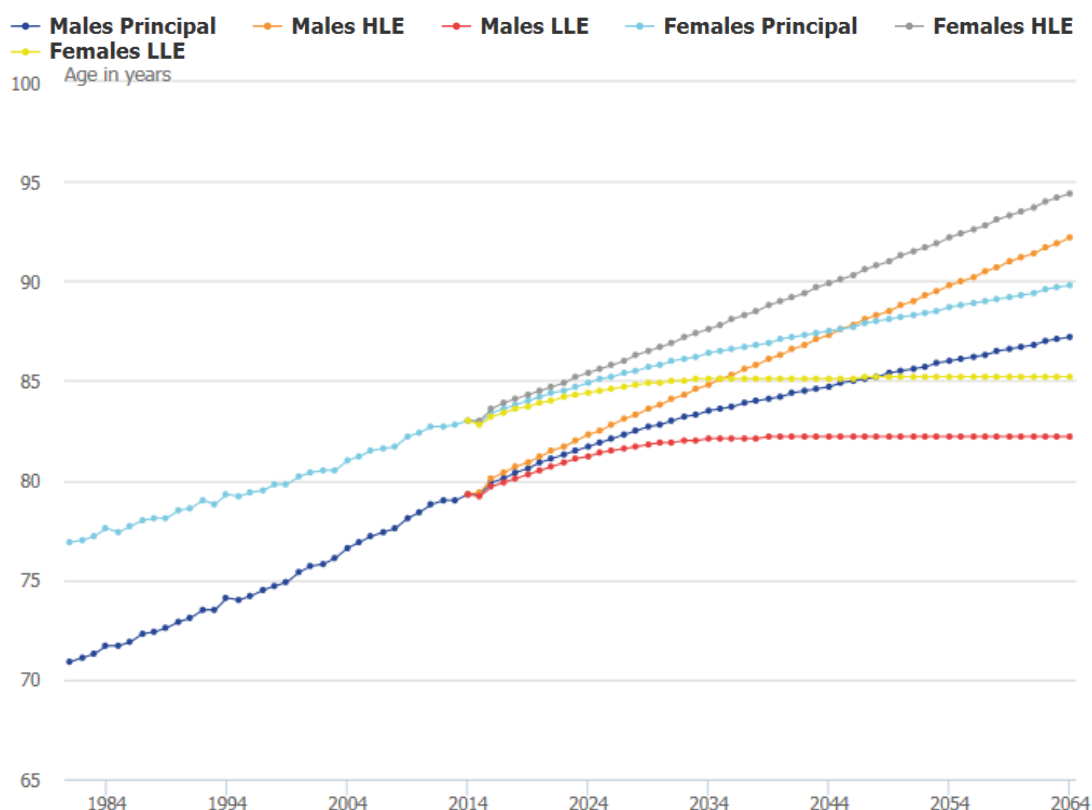
<sup>116</sup> The average period that a person may expect to live.

<sup>117</sup> Period life expectancy at a given age for an area is the average number of years a person would live, if he or she experienced the particular area's age-specific mortality rates for that time period throughout his or her life.

<sup>118</sup> ONS (2015) *Past and projected data from the period and cohort life tables: 2014-based, UK, 1981 to 2064*. Available online at: <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/lifeexpectancies/bulletins/pastandprojecteddatabrothetheperiodandcohortlifetables/2014baseduk1981to2064>

## Human Health

Figure 3.1 Period life expectancy at birth for males and females, UK, 1981-2064



Source: Office for National Statistics.

### England

Life expectancy at birth for males in England has increased from 71.1 years in 1980-82 to 79.4 years in 2013-15, an increase of 8.3 years. For females, life expectancy increased by 6.0 years from 77.0 to 83.0 years over the same period. As a result, the gap in life expectancy between genders over this time has decreased from 6 years to 3.7 years.

Between 1993 and 2014, the proportion of the population in England reporting very good and good general health has fluctuated between 74% and 78% among men and between 73% and 76% among women, with no clear pattern of variation. The prevalence of very bad or bad general health has ranged from 4% to 8% across both sexes over the same period.

The current general trend in human health is generally towards greater life expectancy and healthier lifestyles, including reductions in smoking prevalence and excessive alcohol consumption, and increases in fruit and vegetable consumption and physical exercise over the last 10 years. However, levels of obesity and the prevalence of certain conditions such as diabetes have increased across this period<sup>119</sup>.

### Scotland

Male life expectancy has improved across Scotland as a whole over the last 30 years (from 69.1 years in 1980-82 to 77.1 years in 2013-2015). Female life expectancy has also improved across Scotland, from 75.3 years in

<sup>119</sup> HSCIC (2014) *Health Survey for England 2014: Trend Tables Commentary*. Available online at: <http://content.digital.nhs.uk/catalogue/PUB19297/HSE2014-Trend-commentary.pdf>

## Human Health

1980-82 to 81.1 years in 2013-15. As a result, the gap in life expectancy between genders over this time has decreased from 6.2 years to 4.1 years. Overall life expectancy in Scotland still lags behind the rest of the UK and most Western European nations.

All-cause mortality rates for young working-age adults (people aged 15-44) have declined in the last ten years from 119 in 2002-04 to 105 per 100,000 population in 2011-13. However, these rates remain relatively high compared to other Western European countries<sup>120</sup>. Alcohol related hospital admissions have been declining since 2007/08, while self-assessment of 'good' or 'very good' general health has stayed relatively stable between 74% and 77% over this period<sup>121</sup>.

### Wales

Life expectancy for males in Wales has increased from 70.4 years in 1980-82 to 78.4 years in 2013-15, an increase of 8 years. For females, life expectancy increased by 5.9 years from 76.4 to 82.3 years over the same period. As a result, the gap in life expectancy between genders over this time has decreased from 6 years to 4 years.

There has been a decrease in smoking rates in Wales since 2003/04, while obesity levels have increased during this time. There has also been a slight increase in adults reporting being treated for diabetes and mental illness, and levels of high blood pressure are higher than in 2003/04. By contrast, levels of heart conditions and arthritis have decreased. There has also been a slight decrease in reporting of 'fair' or 'poor' general health during this time.

Key strategic aims for NHS Wales in the Together for Health 5 year vision include:

- reduce health inequality;
- reduce obesity, smoking, drug and alcohol abuse;
- making access to primary services easier;
- increasing the range of local services reducing the need for travel;
- guarantee respect and dignity to patients; and
- systems for assuring high quality care will match the best in the world<sup>122</sup>.

## 3.6 Assessing Significance

The objectives and guide questions related to health which have been identified for use in the appraisal of the effects of Water Resources NPS proposals are set out in **Table 3.1**, together with reasons for their selection.

<sup>120</sup> NHS Scotland (2015) *Health and Wellbeing Profiles 2015, Scotland Overview Report*. Available online at: <http://www.scotpho.org.uk/opt/Reports/ScotPHO-Health-Wellbeing-Report-2015-150731-web.pdf>

<sup>121</sup> Scottish Government. *National Indicators: Reduce alcohol related hospital admissions; Improve self-assessed general health*. Available online at:

<http://www.gov.scot/About/Performance/scotPerforms/indicator>

<sup>122</sup> Welsh Government (2011) *Together for Health*. Available online at:

<http://wales.gov.uk/docs/dhss/publications/111101togetheren.pdf>

## Human Health

Table 3.1 Approach to Assessing the Effects of the Water Resources NPS on Human Health

Objective/Guide Question	Reasoning
<b>Objective: To ensure the protection and enhancement of human health and wellbeing.</b>	<p>The SEA Directive (2001/42/EC) requires that likely significant effects on human health be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.</p> <p>A reliable source of clean water is required to ensure human health. The increase in the severity of drought, particularly in the south and east of England could also pose a risk to health. The inclusion of this AoS objective ensures that these effects can be considered within the AoS.</p>
Will the Water Resources NPS adversely affect human health by resulting in increased nuisance and disruption (e.g. as a result of increased noise levels)?	Nuisance, disturbance and disruption from the construction of water resource infrastructure (in common with many major projects) could occur from the effects of noise, vibration and changes in air quality. The impacts of noise pollution and from vibration on specific localities will need careful consideration in all phases of any project associated with the development of new water infrastructure. Emissions to air may create dust or odours that have the potential to affect air quality or to be classed as a statutory nuisance (as under Environmental Protection Act 1990).
Will the Water Resources NPS disproportionately affect communities already identified as vulnerable / at risk?	There is a duty to protect the health of the local communities, including more vulnerable members of the population, such as children as set out in CEHAPE (2004) and UK CEHAPE strategy (2007).
Will the Water Resources NPS ensure the continuity of a safe and secure drinking water supply to protect public health?	The Water Supply (Water Quality) Regulations 2016 establish the quality standards of water supplies for human consumption. The developer of the water infrastructure covered by the NPS will be responsible for ensuring water quality meets the regulatory requirements for health.
Will the Water Resources NPS affect opportunities for recreation and physical activity?	Water infrastructure (such as reservoirs) provide significant recreational opportunities e.g. Kielder, Thirlmere, Derwent and Abberton.
Will the Water Resources NPS maintain surface water and bathing water quality within statutory standards	The Water Framework Directive (2000/60/EC) requires the setting of objectives that aim for all inland, coastal and groundwater water bodies to reach a 'good' chemical and ecological status (or for heavily modified water bodies this is 'good' ecological potential). Current WFD classifications indicate that there are still a large proportion of surface water bodies in England (and Wales) that are classified as being of Moderate Ecological status/potential or less. Government strategies such as the Water resources strategy for England and Wales (2009) and Water for Life (2011) include objectives to protect and improve the quality of water bodies. The Bathing Waters Directive (2006/7/EC) sets standards for the quality of bathing waters in terms of the physical, chemical and microbiological parameters.

**Table 3.2** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the health objective.

Table 3.2 Illustrative Guidance for the Assessment of Significance for Human Health

Effect	Description	Illustrative Guidance
	Significant Positive	<ul style="list-style-type: none"> <li>Option would have a significant positive effect on the likely determinants of good health (including employment opportunities, level of deprivation, physical activity,</li> </ul>

## Human Health

Effect	Description	Illustrative Guidance
++		<p>access to open space and recreational activities, environmental quality and community safety);</p> <ul style="list-style-type: none"> <li>Option would have a strong and sustained positive effect on health and well-being and acknowledges the health needs of specific groups in society (e.g. children, mums to be and the elderly);</li> <li>Option supports the provision of healthcare facilities.</li> </ul>
+	Positive	<ul style="list-style-type: none"> <li>Option would have a positive effect on the likely determinants of good health (including employment opportunities, level of deprivation, physical activity, access to open space and recreational activities, environmental quality and community safety);</li> <li>Option would have a positive effect on health and well-being and acknowledges the health needs of specific groups in society (e.g. children, mums to be and the elderly);</li> <li>Option would support the provision of healthcare facilities (i.e. as a result of an increase in the local population linked with employment provision).</li> </ul>
0	Neutral	<ul style="list-style-type: none"> <li>Option would have no observable effects (short, medium and long-term) on the health and well-being of individuals, specific groups in society (e.g. children, mums to be and the elderly) and communities.</li> </ul>
-	Negative	<ul style="list-style-type: none"> <li>Option would have a negative effect on the likely determinants of good health (including employment opportunities, level of deprivation, physical activity, access to open space and recreational activities, improvements to environmental quality and community safety);</li> <li>Option would have a negative effect on the health and well-being of individuals, specific groups in society (e.g. children, mums to be and the elderly) and communities;</li> <li>Option would result in some nuisance and/or disruption to communities, such that some complaints could be expected.</li> </ul>
--	Significant Negative	<ul style="list-style-type: none"> <li>Option would have a significant negative effect on the likely determinants of good health (including employment opportunities, level of deprivation, physical activity, access to open space and recreational activities, improvements to environmental quality and community safety);</li> <li>Option would have a significant negative effect on the health and well-being of individuals, specific groups in society (e.g. children, mums to be and the elderly) and communities;</li> <li>Option would cause statutory nuisance or a sustained and significant nuisance and/or disruption to communities.</li> </ul>
?	Uncertain	<ul style="list-style-type: none"> <li>From the level of information available, the effect that the option would have on this objective is uncertain.</li> </ul>

## Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 3.3** presents the appraisal of the likely significant effects of the draft NPS and the 'no NPS' reasonable alternative on the health AoS objective. The appraisal considers in-turn the three sub-sections used within



## Human Health

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Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making and Mitigation. Account has also been taken of the approach taken to health impacts in EN- 1 (the overarching NPS for energy) and EN-6 (the NPS for nuclear power generation) and the extent to which that approach could or should be replicated in this draft NPS, given that it is intended to be a standalone NPS (as section 1.8 of the draft NPS states). The performance of the draft NPS and the 'no NPS' reasonable alternative are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters 1 – 3 of the draft NPS outlining how the remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the two reasonable alternatives is then summarised along with any proposed mitigation measures.

## Human Health

Table 3.3 Appraisal of the Draft NPS and Reasonable Alternatives: Human Health

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	<b>+/?</b>	<b>+/?</b>	<p><b>Draft NPS:</b> Human health is not included as a specific topic in the 'Generic Impacts' section of the draft NPS. Instead, health is principally addressed through the 'Assessment Principles' for the NPS and in section 3.12 the draft NPS states:</p> <p>3.12.3 "Where the proposed project has likely significant environmental impacts that would have an effect on human beings, the applicant should identify and set out the assessment of any likely significant health impacts. Adequate consultation should be undertaken with key stakeholders such as Public Health England, the Health and Safety Executive, relevant local authorities and local health care groups."</p> <p>3.12.4 "The applicant should identify measures to avoid, reduce or compensate for adverse health impacts and seek enhancement opportunities as appropriate. These impacts may affect people simultaneously, so the applicant, the Examining Authority and the Secretary of State (in determining an application for development consent) should consider the cumulative impact on health."</p> <p>In consequence, despite health not being included as a specific topic in section 4 of the draft NPS, guidance on the assessment of health impacts as part of an Environmental Statement (ES) is still provided. It should also be noted that, reflecting the key determinants of health, there is a strong relationship between human health and a large number of the existing topic sections contained within section 4 of the draft NPS including, in particular:</p> <ul style="list-style-type: none"> <li>• air quality, given the potential for emissions to air to affect human health;</li> <li>• biodiversity and nature conservation, due in particular to the potential for sites of nature conservation interest to help promote wellbeing;</li> <li>• dust, odour, artificial light, smoke and steam, which can affect health and amenity;</li> <li>• flood risk, as flooding can affect the wellbeing of communities, physical health and public safety;</li> <li>• landscape and visual impacts, reflecting the potential for development to affect visual amenity and mental health;</li> <li>• land use including open space, green infrastructure and Green Belt, given the strong linkages between accessibility to open space and green infrastructure and the promotion of healthy lifestyles;</li> <li>• noise, given the potential for noise and vibration to affect amenity and cause disturbance/nuisance which could affect mental health;</li> </ul>

## Human Health

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>resource and waste management, associated in particular with the management of hazardous wastes which could affect human health;</li> <li>socio-economics, population and demographics, reflecting the strong interrelationship between economic prosperity, the provision of services and facilities and health and wellbeing;</li> <li>traffic and transport, due to the potential health and safety impacts associated with vehicle movements and the potential for walking and cycling to contribute to healthy lifestyles;</li> <li>water quality and resources, given the importance of a clean water supply to human health.</li> </ul> <p>The guidance for applicants contained in these sections of the draft NPS is considered elsewhere in Appendix B and is therefore not repeated here.</p> <p>The requirement for the significant effects of water resources infrastructure development on health-related topics to be assessed, together with the draft NPS assessment principle on health specifically, are considered to have a positive effect on this AoS objective. However, it is considered that, as currently drafted, the draft NPS lacks detailed guidance on the assessment of health impacts associated with the construction and operation of nationally significant water resources infrastructure and therefore some uncertainty remains (relative to other AoS objectives).</p> <p><u>Recommendations for Improvement</u></p> <p>It is recommended that human health be included as a stand-alone topic within section 4 'Generic Impacts' of the draft NPS. The 'Applicant's Assessment' text therein could usefully identify the key determinants of health and refer to the Planning Practice Guidance (PPG) on how health and well-being and effects on associated infrastructure, services and facilities should be considered in decisions making.</p> <p>Within this section, guidance could be included in respect of engagement with key stakeholders such as Public Health England, the Health and Safety Executive, relevant local authorities, clinical commissioning groups and health and wellbeing boards. Direction could additionally be provided on the need for applicants to identify appropriate mitigation and enhancement measures.</p> <p>The 'Applicant's Assessment' text could explicitly require the consideration of human health as part of an ES (in accordance with the EIA Regulations) with reference provided to guidance on integrating health considerations into EIA (see, for example,</p>

## Human Health

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><i>Health in Environmental Assessment: a primer for a proportionate approach</i> (2017)<sup>123</sup> and <i>Health and Environmental Impact Assessment: a briefing for public health teams in England</i> (2017)<sup>124</sup>. Specification of the contents of the ES could be drawn from the following, which in turn serves as the reference point for the detail of the 'Decision Making' section:</p> <ul style="list-style-type: none"> <li>• Scoping <ul style="list-style-type: none"> <li>○ Identify the relevant legislation, policy and guidance with regards to health.</li> <li>○ With reference to the guidance identified, outline what constitutes a significant impact with regard to health.</li> <li>○ Identify and evaluate the health characteristics of the population within a defined study area (this is expected to include consultation with relevant stakeholders) including the identification of potentially vulnerable groups/receptors (which may also include workers).</li> <li>○ Describe any future anticipated changes to the health baseline in the absence of the proposed infrastructure, to inform the assessment of impacts.</li> <li>○ Identify the potential significant effects requiring further assessment during both the construction and operational stages.</li> <li>○ Provide the methodological basis for determining significance of effects and the scope of effects to be assessed; this may include a detailed Health Impact Assessment (HIA).</li> </ul> </li> <li>• Impact assessment <ul style="list-style-type: none"> <li>○ Assess and characterise the health impacts and their effects (including scale, duration and significance), identifying the anticipated health outcomes. This is likely to include a qualitative assessment of the health effects, based on the quantitative modelling and analysis reported in the air quality, noise and transport ES chapters respectively. Consideration may also need to be given to other ES topics such as socio-economics, land use and water which can influence human health (as highlighted above). Depending on the nature and location of the development, the ES may need to assess, where relevant, vulnerability to risks of major accidents and/or disasters that are relevant.</li> </ul> </li> </ul>

<sup>123</sup> Cave B, Fothergill J, Pyper R, Gibson G, Saunders P (2017) *Health in Environmental Impact Assessment: a primer for a proportionate approach*. IEMA, Faculty of Public Health and Ben Cave Associates Ltd. Lincoln, England.

<sup>124</sup> Cave B, Fothergill J, Pyper R, Gibson G (2017) *Health and Environmental Impact Assessment: a briefing for public health teams in England*. Public Health England. London, England.

## Human Health

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>○ Assess the residual health impacts of the project remaining after mitigation and the significance of their effects, including cumulative effects.</li> <li>○ Evaluate avoidance, mitigation, compensation and enhancement measures that may be necessary.</li> <li>• Avoidance, mitigation, compensation and enhancement <ul style="list-style-type: none"> <li>○ Identify and incorporate measures to avoid, reduce and compensate for health impacts and, where possible, enhance beneficial effects.</li> <li>○ Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.</li> </ul> </li> </ul>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and the EIA Regulations which would require consideration of the effects of nationally significant water resources infrastructure on health. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on health. In consequence, even without the NPS, this alternative would still be considered to have a positive effect in relation to health. However, the absence of any specific guidance on health risks inconsistency in interpretation, particularly at a project level which could have uncertain outcomes (and at least the possibility that all beneficial effects are not enhanced and all adverse effects not avoided, minimised or mitigated).</p> <p>Overall, this alternative has been assessed as being likely to have a positive effect on this AoS objective, although a degree of uncertainty persists.</p>
<b>Decision Making</b>	<b>+/?</b>	<b>+/?</b>	<p><b>Draft NPS:</b> Section 3.12.4 of the draft NPS sets out that “<i>the Examining Authority and the Secretary of State (in determining an application for development consent) should consider the cumulative impact on health.</i>” As highlighted above (under ‘Applicant’s Assessment’), there is additionally a strong relationship between human health and a number of the topics within section 4 of the draft NPS. Whilst the draft NPS does not include specific decision making criteria regarding health, this will help to ensure that health is appropriately considered in the decision making process, generating a positive effect on this AoS objective. However, the draft NPS does not explicitly set out the approach to decision making in respect of human health and therefore there remains some uncertainty as to how health will be incorporated into the Secretary of State’s decision making.</p> <p><u>Recommendations for Improvement</u></p>

## Human Health

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>It is recommended that human health be addressed as a stand-alone topic within the 'Generic Impacts' section of the draft NPS and that appropriate guidance be given to inform the Secretary of State's decision making with regards to health issues. This should include those circumstances in which an identified effect on human health should be considered a reason for refusal of development and clear direction in terms of, for example, the use of planning obligations to mitigate adverse health impacts.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and the EIA Regulations which would require the consideration of the effects on health. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on health. In consequence, even without the NPS, this alternative would still be considered to have a positive effect in relation to health. However, the absence of any specific guidance for the Secretary of State on health risks inconsistency in interpretation, particularly at a project level which could have uncertain outcomes.</p> <p>Overall, this alternative has been assessed as being likely to have a positive effect on this AoS objective, although a degree of uncertainty persists.</p>
Mitigation	+	+/?	<p><b>Draft NPS:</b> The 'Assessment Principles' for health contained in section 3.12.4 of the draft NPS states that <i>"The applicant should identify measures to avoid, reduce or compensate for adverse health impacts and seek enhancement opportunities as appropriate."</i> In addition, the mitigation measures proposed in section 4 of the draft NPS (considered elsewhere in Appendix B) include measures to mitigate adverse effects on health and generate benefits (for example, in respect of minimising emissions to air and promoting local employment opportunities and skills development). Therefore, whilst mitigation measures are not identified under a specific health topic in section 4, it is considered that the draft NPS makes a positive contribution to this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>It is recommended that human health be addressed as a stand-alone topic within the 'Generic Impacts' section of the draft NPS and that appropriate guidance be given with respect to the potential impacts of water resources infrastructure and associated mitigation and enhancement measures. This would help to avoid/minimise adverse effects and enhance positive effects associated with the development of nationally significant water resources infrastructure.</p> <p>In this context, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on health has been undertaken and this is presented below. This review is</p>

## Human Health

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>intended to help identify where mitigation measures could be included in the draft NPS to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p> <p><i>Construction</i></p> <p>Depending on the location of development and the proximity of sensitive receptors, construction activity and associated HGV movements have the potential to lead to noise, vibration, water and air pollution which could adversely affect human health.</p> <p>The construction of new reservoirs/enlargement of existing reservoirs may require the temporary (and possibly permanent) closure of areas used for public recreation, such as public open space and footpaths which could have indirect adverse impacts on health and wellbeing. With specific regard to reservoir enlargement, this may include the temporary closure of a reservoir that provides recreational opportunities.</p> <p>There is the potential for an influx of construction workers to host communities to increase pressure on existing healthcare services (albeit temporarily).</p> <p><i>Operation</i></p> <p>Once operational, a reservoir would be expected to play an important role in providing a resilient supply of potable water.</p> <p>Reservoirs provide an opportunity for a broad range of recreational activities, primarily those related to water sports but also walking/cycling routes, which can improve health and wellbeing. However, it should be noted that without the correct maintenance of water quality, there is the potential for health risks to recreational users of reservoirs including algal blooms and high suspended sediment concentrations that can affect recreational pathogens and hydrogen sulphide concentrations also pose a health risk.</p> <p><b>Water Transfer Schemes</b></p> <p><i>Construction</i></p> <p>Depending on the location of development and the proximity of sensitive receptors, construction activity and associated HGV movements have the potential to lead to noise, vibration, water and air pollution which could adversely affect human health.</p> <p>Pipeline and associated infrastructure works may require the temporary closure of areas used for public recreation, such as public open space and footpaths. This may have indirect adverse impacts on health and wellbeing.</p>

## Human Health

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>There is the potential for an influx of construction workers to host communities to increase pressure on existing healthcare services (albeit temporarily).</p> <p><i>Operation</i></p> <p>Once operational, water transfer schemes would be expected to play an important role in providing a resilient supply of potable water.</p> <p>There is the potential for the transfer of water to have adverse impacts on recreational users of donor waterbodies (e.g. fishing and water sports) due to, for example, reduced downstream flows or reservoir levels.</p> <p><b>Desalination</b></p> <p><i>Construction</i></p> <p>Depending on the location of development and the proximity of sensitive receptors, construction activity and associated HGV movements have the potential to lead to noise, vibration, water (including bathing water) and air pollution which could adversely affect human health.</p> <p>Development may require the temporary closure of areas used for public recreation, such as public open space and footpaths.</p> <p>There is the potential for an influx of construction workers to host communities to increase pressure on existing healthcare services (albeit temporarily).</p> <p><i>Operation</i></p> <p>Once operational, a desalination plant would be expected to play an important role in providing a resilient supply of potable water.</p> <p>Desalination removes iodine from water and could increase risk of iodine deficiency disorders if this is not re-added, although micronutrient deficiencies could be addressed by re-adding elements to the water.</p> <p><b>Potential mitigation measures identified through a review draft WRMPs and their associated SEA Environmental Reports include:</b></p> <ul style="list-style-type: none"> <li>• Siting decisions and construction activities should be undertaken so as to avoid or minimise adverse effects on recreational areas, such as footpaths or open spaces that may be subject to closure.</li> </ul>



## Human Health

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>Noise, traffic disruption and visual impacts should be considered and minimised in accordance with a Construction Environment Management Plan.</li> <li>The routing and timing of HGV movements should, where possible, seek to avoid impacts on local communities.</li> <li>Consideration should be given to the utilisation of waterborne and rail transport to deliver heavy freight in order to minimise traffic related impacts on local communities.</li> <li>Care should be taken during construction regarding the potential for contaminants such as silt, concrete or fuel oil to pollute water courses via surface run off. This can be mitigated by undertaking all construction activities in accordance with relevant best practice pollution prevention guidance.</li> <li>Where possible, opportunities should be sought to enhance open space provision and recreation as part of new developments.</li> <li>Appropriate steps should be taken to ensure that water quality is considered in respect of the safety of any recreational users of a reservoir, with the potential to close the reservoir to recreational use where the risk is considered sufficient.</li> </ul>
			<p><b>No NPS:</b> Under this alternative, appropriate mitigation measures will be considered by the relevant authority in light of the proposals submitted. As such, mitigation measures will be forthcoming but there is the risk that they will not be comprehensive or consistent (without the direction and guidance given in a NPS) and so will not fully address any effects arising or is accompanied by greater uncertainty.</p>
<b>Other Sections of the Draft NPS Relevant to Human Health</b>	<p>The following provides additional commentary on the text in the other sections of the draft NPS relevant to health. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b><u>1. Introduction</u></b></p> <p><b>1.1. Background and scope of this NPS</b> – reference to the AoS prepared in support of the draft NPS will help to ensure that effects on health are given proper consideration, notwithstanding the fact that there remains uncertainty over potential impacts, particularly in respect of the absence of specific locations and likely effects within the draft NPS.</p>		

## Human Health

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>With regard to para 1.1.8, there is an opportunity for the consideration of effects on health in a specific locality through the preparation of a local impact report submitted by a local authority in accordance with the Planning Act 2008. There is no prescribed format for local impact reports but there is clearly an opportunity for a local authority to comment on relevant issues, helping to ensure that consideration is given to likely effects in a particular locality.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on health in Scotland and Wales.</p> <p><b>1.3. Infrastructure covered by the Water Resources NPS</b> – as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on health.</p> <p><b><u>2. Government Policy and the need for water resources infrastructure</u></b></p> <p><b>2.2 Pressure on water supply now and in the future</b> – identifies the need to ensure a robust and stable supply of water to meet increasing demand.</p> <p><b>2.5. The role of water resource management plans in identifying the need</b> – as noted, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on health. This is reflected in paragraph 2.5.7.</p> <p><b>2.6 The role of nationally significant infrastructure projects</b> – the section identifies that alongside reservoirs, water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP, when assessed against the relevant threshold in the Planning Act 2008 or through a section 35 referral. These infrastructure types may have health impacts of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p> <p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p><b><u>3. Assessment Principles</u></b></p> <p><b>3.1 General principles of assessment</b> - the provisions of the Planning Act 2008 and the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, provides the starting point for the assessment of potential health impacts and the identification of mitigation.</p> <p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on health.</p> <p><b>3.2 Environmental Impact Assessment</b> – the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that effects on health are fully considered, as will the consideration of cumulative effects and interrelationships between effects.</p>

## Human Health

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<p>This section specifically highlights that information gathered from the WRMP options assessments and the draft NPS will also be useful to identify the significant effects of a proposed project.</p> <p><b>3.5 Assessing alternatives</b> – the requirement that reasonable alternatives will need to be considered as part of scheme design and project planning, including as part of the WRMP options appraisal process, should ensure that health related issues are taken into account, both in terms of protection and opportunities for mitigation and enhancement.</p> <p><b>3.6 Criteria for ‘good design’ for water resources infrastructure</b> – no direct relationship identified; however, the requirement for good, sustainable design may encourage applicants to consider the health impacts of development proposals and identify opportunities for mitigation and enhancement.</p> <p><b>3.8 Environmental regulation</b> – pollution control and other environmental regulatory regimes help to ensure that proposals do not affect human health (for example, due to discharges of pollutants to land, air and water).</p> <p><b>3.9 Common law nuisance and statutory nuisance</b> – states that: “During the examination of an application for development consent for infrastructure covered under this NPS, possible sources of nuisance under section 79(1) of the Environmental Protection Act 1990 should be considered by the Examining Authority. The Examining Authority should also consider how those sources of nuisance might be mitigated or limited so they can recommend appropriate requirements that the Secretary of State might include in any subsequent order granting development consent.” Provisions in relation to statutory nuisance will help ensure that significant effects in relation to health (e.g. noise) are avoided.</p> <p><b>3.10 Safety</b> –highlights the role of other safety regimes (principally the Reservoirs Act 1975) and the need for consultation with relevant bodies such as local authorities and the Health and Safety Executive. This section also notes that, under the EIA Regulations, there is a requirement to consider the implications of major accidents or disasters.</p> <p><b>3.11. Security considerations</b> –outlines established security considerations and responsible Government departments, which would apply to nationally significant water resources infrastructure.</p> <p><b>3.12 Health</b> – The contents of this section are considered above (under the ‘Applicant’s Assessment’, ‘Decision Making’ and ‘Mitigation’ sections) and is therefore not repeated here.</p>		
<b>Summary Appraisal of Likely Significant Effects</b>	<b>+/?</b>	<b>+/?</b>	<p><b>Draft NPS:</b> There is potential for the construction and operation of nationally significant water resources infrastructure to adversely affect human health due to, for example, noise, vibration and water and air pollution. Development may also affect (positive or negatively) access to open space and green infrastructure which can influence health whilst an increase in the number of construction workers in an area during the construction of new water infrastructure could increase pressure on local healthcare facilities.</p>

## Human Health

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>In this context, the assessment of the draft NPS has identified that, taken together, the guidance provided in the assessment principles and in those health-related topics that comprise section 4 of the draft NPS would have a positive effect on this AoS objective. However, due to the absence of specific guidance within the 'Generic Impacts' section, it is considered that there remains a degree of uncertainty.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and the EIA Regulations which would require consideration of the effects on health. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on health. In consequence, even without the NPS, this alternative would still be considered to have a positive effect on this AoS objective.</p> <p>However, the absence of specific guidance on health impacts risks inconsistency in interpretation, particularly at a project level which could have more uncertain outcomes (and at least the possibility that all beneficial effects are not enhanced and all adverse effects not avoided, minimised or mitigated).</p> <p>Overall, this alternative has been assessed as likely to have a positive effect on the human health AoS objective, although a degree of uncertainty persists.</p>
<b>Summary of Recommended Mitigation and Enhancement</b>	<p>The draft NPS makes a positive contribution to the AoS objective for health, although some uncertainty remains. The impacts of nationally significant water resources infrastructure on health could be substantive and the inclusion of this topic in section 4 of the draft NPS would allow for further, more detailed guidance to be provided to applicants and the Secretary of State in this regard. In consequence, it is considered that health should be included as a topic in section 4 of the draft NPS. A specific section relating to health could include (inter alia):</p> <ul style="list-style-type: none"> <li>• linkages to the PPG and current guidelines with respect to the assessment of human health in an EIA;</li> <li>• guidance on engagement with relevant stakeholders;</li> <li>• an outline of the possible contents of an ES and associated HIA;</li> <li>• guidance for the Secretary of State, including in respect of those circumstances in which an identified effect on human health should be considered a reason for refusal of development, and clear direction in terms of, for example, the use of planning obligations to mitigate adverse health impacts.</li> <li>• an overview of the potential impacts of water resources infrastructure on health and associated mitigation and enhancement measures. In this regard, the following mitigation measures could be included:</li> </ul>		

## Human Health

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"><li>○ Siting decisions and construction activities should be undertaken so as to avoid or minimise adverse effects on recreational areas, such as footpaths or open spaces that may be subject to closure.</li><li>○ Noise, traffic disruption and visual impacts should be considered and minimised in accordance with a Construction Environment Management Plan.</li><li>○ The routing and timing of HGV movements should, where possible, seek to avoid impacts on local communities.</li><li>○ Consideration should be given to the utilisation of waterborne and rail transport to deliver heavy freight in order to minimise traffic related impacts on local communities.</li><li>○ Care should be taken during construction regarding the potential for contaminants such as silt, concrete or fuel oil to pollute water courses via surface run off. This can be mitigated by undertaking all construction activities in accordance with relevant best practice pollution prevention guidance.</li><li>○ Where possible, opportunities should be sought to enhance open space provision and recreation as part of new developments.</li><li>○ Appropriate steps should be taken to ensure that water quality is considered in respect of the safety of any recreational users of a reservoir, with the potential to close the reservoir to recreational use where the risk is considered sufficient.</li></ul>

## Land Use, Geology and Soils

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# 4. Land Use, Geology and Soils

## 4.1 Introduction

This section presents the overview of plans, programmes and baseline information for the appraisal of sustainability of the National Policy Statement for Water Resources in respect of land use, geology and soils.

Land use in this context is concerned with the effective use of land, i.e. by encouraging the reuse of land that has been previously developed (brownfield land) as well promoting sustainable patterns of land use, e.g. in relation to the protection of open spaces and green infrastructure. Geology and soils is concerned with important geological sites, the contamination of soils and high quality agricultural land.

There are links between the land use, geology and soil topic and other topics in the Appraisal of Sustainability (AoS), including biodiversity and nature conservation, human health, climate change, waste and resources and landscape and townscape.

## 4.2 Review of Plans and Programmes

The government's stated aim for soils in ***Safeguarding our Soils, A Strategy for England*** is that all soils are managed sustainably by 2030 and degradation threats are tackled quickly. Planning policy also provides the context both for the prevention and remediation of contaminated land. The NPPF and supporting Planning Practice Guidance encourage the effective use of land by reusing land that has been previously developed, provided that it is not of high environmental value. Through promoting the sustainable use of soils and the remediation of contaminated land, the plans and programmes provide a framework for the protection of soil and water resources.

### International/European

The first ***World Soil Charter*** was adopted in 1981 by members of the Food and Agriculture Organization of the United Nations (FAO), which highlighted key principles and guidelines related to soil conservation. In 2015, member countries endorsed an updated World Soil Charter to promote sustainable soil management at all levels.

The ***European Thematic Strategy on Soil Protection (2006)*** sets out the European Commission's strategy on soils. The overall objective of the Strategy is the protection and sustainable use of soil, based on the following guiding principles:

- preventing further soil degradation and preserving its functions;
- when soil is used and its functions are exploited, action has to be taken on soil use and management patterns;
- when soil acts as a sink/receptor of the effects of human activities or environmental phenomena, action has to be taken at source; and
- restoring degraded soils to a level of functionality consistent at least with current and intended use, thus also considering the cost implications of the restoration of soil.

The Strategy also included a proposal for a Soils Directive. However, the proposal for a Directive has since been withdrawn (May 2014) with the Commission stating that it "*remains committed to the objective of the*

## Land Use, Geology and Soils

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*protection of soil".* The commitment to sustainable soil use is in line with the **Seventh Environment Action Programme**, (7th EAP) which provides that by 2020 "*land is managed sustainably in the Union, soil is adequately protected and the remediation of contaminated sites is well underway*" and commits the EU and its Member States to "*increasing efforts to reduce soil erosion and increase organic matter, to remediate contaminated sites and to enhance the integration of land use aspects into coordinated decision-making involving all relevant levels of government, supported by the adoption of targets on soil and on land as a resource, and land planning objectives*". It commits the EU and its Member States to increasing efforts to reduce soil erosion, increase soil organic matter and to remediate contaminated sites. This reiterates a number of soil and land use commitments in the **2011 Road Map for Resource-Efficient Europe** (part of Europe 2020). The EAP builds on the commitments of the **2012 United Nations Conference on Sustainable Development (Rio+20)** which recognises the economic and social significance of good land management, and calls for a 'land degradation neutral world'.

The **Industrial Emissions Directive (IED) (2010/75/EU)** combines seven previous directives, including the Large Combustion Plant Directive and the Integrated Pollution Prevention and Control (IPPC) Directive. It applies an integrated environmental approach to the regulation of certain industrial activities, which means that emissions to air, water and land must be considered together. Regulators must set permit conditions so as to achieve a high level of protection for the environment as a whole, based on the use of the best available techniques (BAT), which balances the costs to the operator against the benefits to the environment. The Directive specifies that permit conditions must be included to ensure the protection of soil quality.

A number of other European Directives contribute indirectly to soil protection including the **Habitats Directive (92/43/EEC)**, **Ambient Air Quality and Cleaner Air for Europe Directive (2008/50/EC)**, **Water Framework Directive (WFD) (2000/60/EC)**, **Nitrates Directive (91/676/EEC)** and **Sewage Sludge Directive (86/278/EEC)**.

## UK

The **Environmental Protection Act 1990** defines within England, Scotland and Wales the legal framework for duty of care for waste, contaminated land and statutory nuisance.

The **Environment Act 1995** seeks to protect and preserve the environment and guard against pollution to air, land or water. The Act adopts an integrated approach to environmental protection and outlines where authorisation is required from relevant authorities to carry out certain procedures as well as outlining the responsibilities of the relevant authorities. The Act also amends the Environmental Protection Act 1990 with regard compulsory remediation of contaminated land.

The **Wildlife and Countryside Act 1981** allows the designation of Sites of Special Scientific Interest (SSSI) for sites with geological importance.

The **Environmental Permitting (England and Wales) Regulations 2016** (SI 2016/1154) consolidates a range of previous permits required for processes which might cause pollution. It covers water discharges, groundwater activities, radioactive substances, waste, mining and installations. It requires operators to obtain permits for some facilities, to register others as exempt and provides for ongoing supervision by regulators. The aim of the regime is to:

- protect the environment so that statutory and Government policy, environmental targets and outcomes are achieved;
- deliver permitting and compliance with permits and certain environmental targets effectively and efficiently in a way that provides increased clarity and minimises the administrative burden on both the regulator and the operators;

## Land Use, Geology and Soils

- encourage regulators to promote best practice in the operation of facilities; and
- continue to fully implement European legislation.

The Forestry Commission's **National Forest Inventory** takes place every 10-15 years, with the most recent beginning in 2009. It provides a record of key information about the Great Britain's forests and woodlands. This information is useful to many people and organisations involved in forestry and land management, as well as in the wider world of planning, policy development and business.

The **Ancient Woodland Inventory**<sup>125</sup> identifies woodlands that have had a continuous woodland cover for centuries. Studies show that these woodlands are typically more ecologically diverse, and of higher nature conservation value, than those that have developed recently or those where woodland cover on the site has been intermittent. They may also be culturally important.

### England

In 2009, Defra published **Safeguarding our Soils, A Strategy for England**. The vision in this Strategy is that by 2030, all of England's soils will be managed sustainably and degradation threats will be tackled successfully. The overall aspiration is that this will improve the quality of England's soils and safeguard their ability to provide essential services for future generations. In June 2011, the Government reiterated its vision and 2030 target for England's soils in the **Natural Environment White Paper (Defra, 2011)**. As part of this vision, the Government committed to undertaking further research to explore how soil degradation can affect the soil's ability to support vital ecosystem services; and how best to manage lowland peatlands in a way that supports efforts to tackle climate change. This will inform future policies and the direction of future action towards 2030.

The **Contaminated Land (England) Regulations 2006** (SI 2006/1380) sets out provisions relating to the identification and remediation of contaminated land. The **Environmental Damage (Prevention and Remediation) (England) Regulations 2015** (SI 2015/810) require action in response to the most significant cases of environmental damage including in respect of risks to human health from contamination of land.

The **National Planning Policy Framework (MHCLG, 2018)** sets out the Government's planning policy for the use of land in England. With specific regard to geology and soils, it states that "planning policies and decisions should contribute to and enhance the natural and local environment by protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils" (paragraph 170). The NPPF states that planning policies should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions (paragraph 117). Planning authorities should also recognise that some undeveloped land can perform many functions, such as for wildlife, recreation, flood risk mitigation, cooling/shading, carbon storage or food production (paragraph 118). Where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality (paragraph 171).

In 2014, the Department for Communities and Local Government (DCLG) published online Planning Practice Guidance. Sections of specific relevance include *Land Affected by Contamination (2014)* in addition to *Brownfield Land, Soils and Agricultural Land (2014)* and *Green Infrastructure (2016)* under the 'Natural Environment' guidance.

<sup>125</sup> Actively maintained by Natural England, Natural Resources Wales, Scottish Natural Heritage and the Woodland Trust in Northern Ireland.



## Land Use, Geology and Soils

**A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)** includes a range of policies and associated actions relating to the sustainable use of land. These actions include (inter alia) measures to incentivise land management, improve soil health and restore and protect peatlands.

### Scotland

The main aim of the **Scottish Soil Framework (2009)** is to promote the sustainable management and protection of soils consistent with the economic, social and environmental needs of Scotland. The Framework identifies a wide range of activities that will contribute to 13 soil outcomes, including factors such as maintaining soil structure, reducing soil erosion and where possible remediating, maintaining and enhancing soil's productive capacity.

**Scottish Planning Policy (2014)** sets out the Scottish Government's policy on land use planning. The SPP states that the planning system should seek to protect soils from damage such as erosion or compaction and limits development on prime agricultural land.

The third **National Planning Framework (NPF3)** was published in June 2014 and sets the spatial expression of the Scottish Government's Economic Strategy, and of plans for development and investment in infrastructure. The NPF identifies national developments and other strategically important development opportunities in Scotland.

**Planning Advice Note 33: Development of Contaminated Land (PAN33) (Revised October 2000)** provides advice on implications of the development of contaminated land and the approach to contaminated land in development plans.

Scotland's second land use strategy, **Getting the Best from Our Land: A land use strategy for Scotland 2016-2021**, was published in 2016. It retains the long-term vision; three Objectives relating to the economy, environment and communities; and the Principles for Sustainable Land Use from the first land use strategy. It takes a strategic approach to the challenges facing land use in Scotland and sets out the following vision: "A Scotland where we fully recognise, understand and value the importance of our land resources, and where our plans and decisions about land use deliver improved and enduring benefits, enhancing the wellbeing of our nation." This vision is underpinned by the following objectives:

- land based businesses working with nature to contribute more to Scotland's prosperity;
- responsible stewardship of Scotland's natural resources delivering more benefits to Scotland's people; and
- urban and rural communities better connected to the land, with more people enjoying the land and positively influencing land use.

A scheme for remedying contaminated land is introduced in the **Contaminated Land (Scotland) Regulations 2000** (SSI 2000/178) and **Contaminated Land (Scotland) Regulations 2005** (SSI 2005/658). This scheme identifies special sites' enforced by Scottish Environment Protection Agency (SEPA), remediation notices and their contents, and sets out the information to be held on a contaminated land register maintained by local councils. The **Pollution Prevention and Control (Scotland) Regulations 2012** (SSI 2012/360) permit and regulate many industrial activities that may pollute our environment. The **Environmental Liability (Scotland) Regulations 2009** (SSI 2009/266) oblige operators of certain activities to take preventative measures where there is an imminent threat of environmental damage, and to remediate any environmental damage caused by their activities.

The **Scottish Forestry Strategy (2006)** also includes objectives relating to sustainable soil management and protection.

## Land Use, Geology and Soils

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### Wales

The **Well-being of Future Generations (Wales) Act 2015** strengthens existing governance arrangements for improving the well-being of Wales to ensure that present needs are met without compromising the ability of future generations to meet their own needs. The act identifies goals to improve the well-being of Wales, introduces national indicators that will measure the difference being made to the well-being of Wales, and simplifies requirements for integrated community planning. The 2016 national indicators include the 'concentration of carbon and organic matter in soil'. This is supported by the **Environment (Wales) Act 2016**, which puts legislation in place to plan and manage Wales' natural resources in a more proactive, sustainable and joined-up way, and includes provisions relating to land management.

**One Wales: One Planet (2009)** sets out proposals to promote sustainable development, how the Welsh Government will make sustainable development a reality for people in Wales, and the benefits that people will see from this, particularly in less well-off communities. With specific regard to land-based resources, the strategy's aim is to "meet the needs of current and future generations without depleting the resources provided by land upon which we all depend". The Welsh Government's **Natural Resources Policy Statement (2015)** also illustrates key priorities including soil, green infrastructure, woodlands and peat management.

The **Wales Spatial Plan (2008)** provides the context and direction of travel for local development plans and the work of local service boards. The 2008 update brings the Wales Spatial Plan into line with One Wales, and gives status to the area work which has developed since 2006. The key themes of the update (and the Wales Spatial Plan before it) are set out below:

- Building Sustainable Communities;
- Promoting a Sustainable Economy;
- Valuing our Environment;
- Achieving Sustainable Accessibility; and
- Respecting Distinctiveness.

The **Planning (Wales) Act 2015** sets out a series of legislative changes to deliver reform of the planning system in Wales. This includes the requirement for a National Development Framework which will set out the Welsh Government's land use priorities and Strategic Development Plans for areas with matters of greater than local significance.

**Planning Policy Wales (Edition 9) (2016)** contains current land use planning policy for Wales. It promotes a preference for the reuse of brownfield land and conservation of the best and most versatile agricultural land and geological assets. Chapter 13 deals with minimising and managing environmental risks and pollution including contaminated and unstable land and seeks to maximise environmental protection for people, natural and cultural resources, property and infrastructure and prevent or manage pollution and promote good environmental practice. Chapter 14 addresses mineral extraction and related development in Wales, which includes all minerals and substances in, on or under land extracted either by underground or surface working.

**Technical Advice Note 5: Nature Conservation and Planning (2009)** includes guidance relating to conservation of geological features such as rocks and soils. **Technical Advice Note 6: Planning for Sustainable Rural Communities (2010)** provides guidance on how the planning system can contribute to: sustainable and rural communities; sustainable rural housing; sustainable rural services; and sustainable agriculture.

## Land Use, Geology and Soils

**Local Development Plans** (LDPs) set out local planning authority proposals and policies for future development and use of land in Wales. As of May 2016, 18 authorities had an adopted LDP with the remainder relying on extant adopted and emerging Unitary Development Plans.

The **Contaminated Land (Wales) Regulations 2006** (WSI 2006/2989) sets out provisions relating to the identification and remediation of contaminated land. The **Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009** (WSI 2009/995) require action in response to the most significant cases of environmental damage including in respect of risks to human health from contamination of land.

**Woodlands for Wales (2009)** is the Welsh Government's strategy for woodlands and trees, which is supported by Policy Position statements including **Water and Soils (2010)** which has the following objectives:

- Woodland management achieves high standards of environmental stewardship where water quality, water resources, soil resources, soil carbon and soil function are safeguarded and enhanced;
- More existing woodland is brought into appropriate and sustainable management and delivers high quality ecosystem services, particularly in catchments at risk of failing good ecological and chemical status; and
- Woodland and trees are better integrated into wider land management practices (especially agriculture) where new woodland and trees support improved environmental, water and soil services and functions (including urban areas).

## 4.3 Overview of the Baseline

### UK

#### Geology

The geology of the UK is diverse and has almost 700 soil types in England and Wales alone<sup>126</sup>. As a broad overview the following rock types exist in a progression from North West to South East (predominant rock types): Tertiary Volcanic Rocks; Crystalline Rock of Pre-Cambrian and later age; Lower Carboniferous to Cambrian; Triassic and Permian; Early Precambrian and Devonian; Jurassic; Cretaceous; Tertiary and Marine Pleistocene; and finally a return to Cretaceous<sup>127</sup>.

The UK has a diversity of mountain ranges and flood plains. In England, the southern part of the country is predominantly lowland, with mountainous terrain north-west of the Tees-Exe line (the Lowland-Upland divide across England), which includes the Cumbrian Mountains of the Lake District, the Pennines and limestone hills of the Peak District, Exmoor and Dartmoor<sup>128</sup>.

The Geological Conservation Review (GCR) was launched in 1977 in order to identify and describe the most important (nationally and internationally) geological sites in Britain, and to create a suite of descriptions which collectively catalogue and display the full range of the UK's earth heritage features. The full geological

<sup>126</sup> Natural England (2008) *State of the Natural Environment 2008*. Available online at:

<http://publications.naturalengland.org.uk/publication/31043?category=118044>

<sup>127</sup> Natural England. *England's geology*. Available online at:

<http://webarchive.nationalarchives.gov.uk/20140605090108/http://www.naturalengland.org.uk/ourwork/conservation/geodiversity/englands/default.aspx>

<sup>128</sup> Natural England (2008) *State of the Natural Environment 2008*. Available online at:

<http://publications.naturalengland.org.uk/publication/31043>

## Land Use, Geology and Soils

chronology from the Cambrian period to the Quaternary is covered in 3,000 sites spanning 100 categories (or 'blocks').

There are over 2,000 geological Sites of Special Scientific Interest (SSSIs) in the UK. Across the UK there are also a number of non-statutory geological and geomorphological sites designated at a local level, i.e. often known as Local Geological Sites (formerly Regionally Important Geological and Geomorphological Sites (RIGS)).

### Land Use and Soils

The UK covers an area of 24,853,200 hectares (248,532 km<sup>2</sup>). England comprises the largest land area in the UK, covering an area of 13,293,800 hectares (132,938 km<sup>2</sup>). The smallest land area in the UK is Northern Ireland, which covers an area of 1,413,000 hectares (14,130 km<sup>2</sup>)<sup>129</sup>.

Average population density of the UK in 2017 is 263 people per square kilometre<sup>130</sup>.

**Table 4.1** shows land cover in the UK as it stood in 2007 and highlights that arable and horticulture and improved grassland are the most common land cover types, constituting 25.5% and 25.3% of total land area in the UK respectively<sup>131</sup>.

**Table 4.1** Estimated Areas of Broad Habitats in the UK in 2007

Land Type	'000 Hectares	% Land Area
Broadleaved, mixed and yew woodland	1,373.3	5.6
Coniferous woodland	1,505.7	6.1
Arable and horticulture	6,300.5	25.5
Improved grassland	6,237.7	25.3
Neutral grassland	1,589	6.4
Calcareous grassland	37.2	0.2
Acid grassland	1,647.1	6.7
Dwarf shrub heath	2,111.8	8.5
Fen, Marsh, Swamp	10.1	0.1
Bog	1,097.2	4.3
Freshwater	324.8	1.3
Montane	488.6	2.0
Inland Rock	131.4	0.5

<sup>129</sup> ONS. *The Countries of the UK*. Available online at: <http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/guide-method/geography/beginner-s-guide/administrative/the-countries-of-the-uk/index.html>

<sup>130</sup> ONS (2017) *Overview of the UK population: March 2017*. Available online at: <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/overviewoftheukpopulation/mar2017>

<sup>131</sup> Countryside Survey (2011) *Final Report for LCM2007*. Available online at: [http://nora.nerc.ac.uk/14854/1/LCM2007\\_Final\\_Report\\_-\\_vCS\\_Web.pdf](http://nora.nerc.ac.uk/14854/1/LCM2007_Final_Report_-_vCS_Web.pdf)

## Land Use, Geology and Soils

Land Type	'000 Hectares	% Land Area
Built-up Areas and Gardens	1,464.8	6.0
Other land	363.3	1.5
<b>Total</b>	<b>24,682.5</b>	<b>100%</b>

Source: Countryside Survey, LCM2007.

According to the 2011 UK National Ecosystem Assessment, 6.8% of the UK's land area is classified as urban, the urban landscape accounts for 10.6% of England, 1.9% of Scotland, 3.6% of Northern Ireland and 4.1% of Wales (and encompass some agricultural land). The remainder of the population live in smaller towns and villages, with a very small proportion scattered through the countryside<sup>132</sup>.

Within the rural areas, land use varies greatly on a very local basis, but there are clear regional trends. There is a much higher proportion of arable farming in the east than in the west, with most of East Anglia and the area around the Wash almost entirely arable or devoted to other forms of intensive agriculture. To the west, there is much more grassland, although a high proportion of it is improved grassland, particularly in lowland areas; this is often cultivated for fodder or silage as much as for grazing. Upland areas, particularly in the north, the west and Wales, tend to have a high proportion of unimproved land used for extensive rather than intensive grazing, mainly for sheep, and large areas of forestry.

National Forest Inventory Woodland Area Statistics for Great Britain highlight that the area of woodland in Great Britain at 31 March 2010 is estimated to be 2,982 thousand hectares, around 13.0% of the total land area in Great Britain<sup>133</sup>.

The quality of land across the UK varies, with the best and most versatile agricultural land generally situated in the lowland and valley areas of England. Due to the topography and terrain, much of Scotland and Wales is classified as lower grade land. An estimated 21% of all farmland in England is classified as Grade 1 ('Excellent') and 2 ('Very Good') land, with a similar percentage graded as Subgrade 3a ('Good') land. These grades are the best and most versatile land grades as classified under the Agricultural Land Classification System (ALC)<sup>134</sup>.

There is estimated to be around 400,000 hectares of contaminated land in the UK (around 1.6% of the total land area)<sup>135</sup>. The UK has a substantial legacy of chemical contaminants in soil. Some contaminants may be present naturally, but more often they occur as a result of human industrial and domestic pollution. Such contamination is typically found in brownfield sites on former industrial land. The majority of such sites are in urban contexts, but a large number are not, particularly those associated with mining or other extractive industries, primary processing of bulk raw materials and power generation.

<sup>132</sup> UNEP (2011) *UK National Ecosystem Assessment, Synthesis of Key Findings 2011*. Available online at: <http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx>

<sup>133</sup> Forestry Commission (2011) *National Forest Inventory Statistics for Great Britain*. Available online at: [https://www.forestry.gov.uk/pdf/NFI\\_GB\\_woodland\\_area\\_stats\\_2010\\_FINAL.pdf/\\$FILE/NFI\\_GB\\_woodland\\_area\\_stats\\_2010\\_FINAL.pdf](https://www.forestry.gov.uk/pdf/NFI_GB_woodland_area_stats_2010_FINAL.pdf/$FILE/NFI_GB_woodland_area_stats_2010_FINAL.pdf)

<sup>134</sup> Natural England (2012) *Agricultural Land Classification: protecting the best and most versatile agricultural land, TIN049*. Available online at: <http://publications.naturalengland.org.uk/file/4424325>

<sup>135</sup> Department for International Trade (2015) *Land remediation: Bringing brownfield sites back to use*. Available online at: <https://www.gov.uk/government/publications/land-remediation-bringing-brownfield-sites-back-to-use/land-remediation-bringing-brownfield-sites-back-to-use>

## Land Use, Geology and Soils

### England

#### Geology

England's landscape is closely associated with its underlying geology. The topography of England is very varied. Lowland areas are generally found in the East of England. The North West is the most mountainous area with other rugged areas found in the South West and central northern regions. There are a number of upland areas across England, such as the South Downs, Cotswolds, Peak District and North York Moors.

In 2008 Natural England reported that there were 1,214 SSSIs designated for their geodiversity features covering 1,704 Geological Conservation Review (GCR) sites (which identified nationally important features of geological interest). Many SSSIs have more than one GCR feature and some GCR features extend over more than one SSSI, giving a total of 1,735 SSSI-GCR combinations, or 'geo-features'. The proportion of GCRs in favourable/recovering status varied between 76-94% depending on its category of GCR (each category is reported separately)<sup>136</sup>.

There are no formal international designations for geodiversity sites equivalent to the SPA and SAC designations for biological features, although the geodiversity of the Dorset and East Devon Coast is recognised through designation as a World Heritage Site.

England contains two Global Geoparks: the English Riviera in Devon and the North Pennines AONB. These are areas considered by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) to be of international importance for geological heritage that should be safeguarded and sustainably managed and include strong local involvement. Two further areas in England (Abberley and Malvern Hills and the Cotswold Hills) identify themselves as national Geoparks<sup>137</sup>.

#### Land Use and Soils

As of 2016, the average population density of England was estimated to be 417 people per square kilometre.

**Table 4.2** shows land cover in England as it stood in 2007 and highlights arable and horticulture and improved grassland as the most common land use covers (covering 40.5% and 27.1% of total land in England respectively)<sup>138</sup>.

Table 4.2 Land Cover in England in 2007

England Land Cover 2007	'000 ha	% Area
Broadleaved, Mixed and Yew Woodland	930	7.1
Coniferous Woodland	303.3	2.3
Arable and Horticulture	5,332.9	40.5
Improved Grassland	3,568.4	27.1
Neutral Grassland	611	4.6

<sup>136</sup> Natural England (2008) *State of the Natural Environment, Chapter 2: Landscapes*. Available online at: <http://publications.naturalengland.org.uk/publication/31043>

<sup>137</sup> UNESCO (2017) *Properties inscribed on the World Heritage List for the United Kingdom*. Available online at: <http://whc.unesco.org/en/statesparties/gb>

<sup>138</sup> Countryside Survey (2011) *Final Report for LCM2007*. Available online at: [http://nora.nerc.ac.uk/14854/1/LCM2007\\_Final\\_Report\\_-\\_vCS\\_Web.pdf](http://nora.nerc.ac.uk/14854/1/LCM2007_Final_Report_-_vCS_Web.pdf)

## Land Use, Geology and Soils

England Land Cover 2007	'000 ha	% Area
Calcareous Grassland	35.9	0.3
Acid Grassland & Bracken	317.1	2.4
Dwarf Shrub Heath	361.0	2.6
Fen, Marsh and Swamp	6.8	0.1
Bog	196.5	1.5
Freshwater	79.8	0.6
Montane	36.6	0.3
Inland rock	42.3	0.3
Built-up Areas and Gardens	1,169	8.9
Supra-littoral rock	1.0	-
Supra-littoral sediment	18.4	0.1
Littoral rock	11.2	0.1
Littoral sediment	161.7	1.2
<b>TOTAL</b>	<b>13,182.9</b>	<b>100</b>

Source: Countryside Survey, LCM2007.

The majority of land in England (around 70%) is in agricultural use. A further 9% is used for woodland and forestry. Whilst urban areas account for around 10% of the total area, only a very small proportion of the land (1.1%) is occupied by domestic buildings (e.g. houses), with domestic gardens accounting for almost half of the 'developed area' (over 4% of the national land area). Marshland, bogs and freshwater areas account for a combined 2.4% of the land area<sup>139</sup>. Of the agricultural land, approximately 42% is classed as best and most versatile land grades ('good' or better).

A total of 511 sites had been reported to the Environment Agency as 'contaminated land' at April 2016, however this is likely to be an underestimate due to a low response rate from local councils. Less than 2% of the land area of England is estimated to have been affected by industrial activities of a type that could have caused contamination<sup>140</sup>.

## Scotland

### Geology

As a broad overview, the following rock types exist in a progression from north east to south west Scotland (predominant rock types): Pre-Cambrian (the Highlands); Carboniferous (Midland Valley area); and Ordovician and Silurian (Southern Uplands). Topographically, Scotland is divided into three main areas; the Highland region in the north, which includes the Cairngorm and Grampian mountain ranges; the Central Lowlands,

<sup>139</sup> UNEP (2011) *UK National Ecosystem Assessment, Chapters 10 (Urban) and 17 (England)*. Available online at: <http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx>

<sup>140</sup> Environment Agency (2016) *Dealing with contaminated land in England*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/513158/State\\_of\\_contaminated\\_land\\_report.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/513158/State_of_contaminated_land_report.pdf)



## Land Use, Geology and Soils

which includes the major cities of Edinburgh and Glasgow; and the Southern Uplands, a pastoral upland area north of the English border.

As of 2012 there were 895 GCR sites in Scotland, of which 77% were protected by SSSI status<sup>141</sup>. Scotland has two Global Geoparks: North West Highlands Geopark and Shetland Geopark, in addition to Lochaber Geopark (which is currently being considered by UNESCO for global status). These three Geoparks cover approximately 10% of Scotland's land area<sup>142</sup>.

### Land Use and Soils

The average population density of Scotland is 69 people per square kilometre. **Table 4.3** shows land cover in Scotland as it stood in 2007 and highlights Dwarf Shrub Heath as the most common land use cover (covering 19.6% of total land in Scotland).

**Table 4.3** Land Cover in Scotland in 2007

Scotland Land Cover 2007	'000 ha	% Area
Broadleaved, Mixed and Yew Woodland	264.2	3.3
Coniferous Woodland	993.8	12.5
Arable and Horticulture	704.1	8.8
Improved Grassland	1,117.8	14.0
Neutral Grassland	575.8	7.20
Calcareous Grassland	1.2	0.03
Acid Grassland & Bracken	1,024.0	12.80
Dwarf Shrub Heath	1,566.0	19.60
Fen, Marsh and Swamp	2.6	0.07
Bog	768.9	9.60
Freshwater	170.3	2.10
Montane	452.0	5.70
Inland Rock	70.5	0.90
Built-up Areas and Gardens	142.1	1.80
Supra-littoral rock	6.0	0.10
Supra-littoral sediment	22.0	0.30
Littoral rock	35.1	0.40
Littoral sediment	60.4	0.80
<b>TOTAL</b>	<b>7,976.8</b>	<b>100</b>

**Source:** Countryside Survey 2007.

<sup>141</sup> Scottish Natural Heritage (2012) *Geological conservation review (GCR) sites*. Available online at: <http://www.snh.gov.uk/protecting-scotlands-nature/safeguarding-geodiversity/protecting-geological-conservation/>

<sup>142</sup> Scottish Natural Heritage (2016) *Protecting Scotland's nature: Geopark*. Available online at: <http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/international-designations/geoparks/>



## Land Use, Geology and Soils

Agricultural uses of land in Scotland cover 75% of the land area, and only 2.4% of the land is urban<sup>143</sup>.

Scotland has a large variety of soils reflecting its geological and climatic diversity. Scotland's soil is predominantly carbon rich, with podzols, peat soils and gleys accounting for more than two-thirds. These soils are found throughout Scotland with the exception of the Central Valley, which is dominated by mineral soils. Soils in the north and west are more acidic on the whole and rich in organic matter. Scotland contains a much higher proportion of organic soils than the rest of the UK<sup>144</sup>.

The quality of land is highly variable with much of Scotland classified as Less Favoured Areas (suited only for improved grassland and rough grazing). Prime agricultural land (suitable for a wide range of crops) make up 8% of the total land area according to the Land Capability for Agriculture Classification Scheme, which is distributed predominantly along the eastern coasts, and the Firths of Forth and Tay<sup>145</sup>.

In 2005, there was estimated to be around 82,034 hectares of land affected by industrial activity in Scotland that may be contaminated. A total of 13 sites (equivalent to 53 hectares) had been determined as 'contaminated land' under the Environmental Protection Act by the end of 2008<sup>146</sup>.

## Wales

### Geology

The bedrock geology of Wales is extremely varied and comprises sandstone, limestone and igneous rock. As a broad overview, the following rock types exist in a progression from North West to South East (predominant rock types): Ordovician; Silurian; Devonian; and Carboniferous<sup>147</sup>. Permo-Triassic and Devonian sandstone as well as Carboniferous Limestone form important groundwater resources in South Wales. Peat, sand and gravel deposits along river valleys support strategic local water supplies.

Coal and metal mining has been very important to Wales historically. The South Wales Coalfield stretches across a large part of South Wales and is still mined to some extent, although less than previously (and from opencast or drift mines rather than deep mines). Lead and silver were once produced from mines in mid-Wales, from a series of mines inland from Aberystwyth. Copper, meanwhile, was mined in Snowdonia and at Parys Mountain on Anglesey, whilst gold was exploited around Dolgellau and Pumpsaint. A number of other metals were produced including zinc, arsenic, antimony and manganese. The geodiversity of Wales has led to the forming of landscapes and environmental settings that have strong cultural service value. For example, the mountains of Snowdonia attract tourists to Wales whilst coal mining has helped to define the cultural identity of the South Wales Valleys.

Within Wales, there are approximately 300 SSSIs designated for geology and earth science features. The Joint Nature Conservation Committee (JNCC) has reported the first six years of Common Standards Monitoring for Geological SSSIs in the UK but limited information is available for SSSIs in Wales in this respect. There are also 485 Geological Conservation Review (GCR)<sup>148</sup> and there are two Global Geoparks

<sup>143</sup> UNEP (2011) *UK National Ecosystem Assessment, Chapter 19 (Scotland)*. Available online at:

<http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx>

<sup>144</sup> The Scottish Government (2009) *Scottish Soil Framework*. Available online at:

<http://www.gov.scot/Resource/Doc/273170/0081576.pdf>

<sup>145</sup> The James Hutton Institute (2011) *Land Capability for Agriculture in Scotland*. Available online at:

[http://www.hutton.ac.uk/sites/default/files/files/soils/lca\\_leaflet\\_hutton.pdf](http://www.hutton.ac.uk/sites/default/files/files/soils/lca_leaflet_hutton.pdf)

<sup>146</sup> SEPA (2009) *Dealing with land contamination in Scotland: A review of progress 2000-2008*. Available online at:

<https://www.sepa.org.uk/media/28314/dealing-with-land-contamination-in-scotland.pdf>

<sup>147</sup> British Geological survey (2018). *Geology and landscape: Wales*. Available online at:

<http://www.bgs.ac.uk/research/ukgeology/wales/home.html>

<sup>148</sup> JNCC. *Geological Conservation Review*. Available online at:

<http://jncc.defra.gov.uk/page-2947>

## Land Use, Geology and Soils

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located in Wales (Fforest Fawr and Ynys Môn)<sup>149</sup>. There are also 800 Regionally Important Geological Sites (RIGS) in Wales.

### Land Use and Soils

The average population density of Wales is 149 people per square kilometre.

**Table 4.4** shows land cover in Wales as it stood in 2007 and highlights improved grassland as the most common land use cover (covering 40.0% of total land in Wales).

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<sup>149</sup> UNESCO (2017) *Global Geoparks*. Available online at:  
<http://www.unesco.org.uk/designation/geoparks/>

## Land Use, Geology and Soils

Table 4.4 Land Cover in Wales in 2007

Wales Land Cover 2007	'000 ha	% Area
Broadleaved, Mixed and Yew Woodland	125.1	5.90
Coniferous Woodland	143.1	6.80
Arable and Horticulture	176.9	8.40
Improved Grassland	842.2	40.00
Neutral Grassland	227.1	10.80
Calcareous Grassland	0.0	0.00
Acid Grassland & Bracken	284.5	13.50
Dwarf Shrub Heath	112.2	5.30
Fen, Marsh and Swamp	6.0	0.05
Bog	41.5	2.00
Freshwater	11.4	0.50
Montane	1.7	0.10
Inland Rock	8.8	0.40
Built-up Areas and Gardens	89.3	4.30
Supra-littoral rock	0.8	0.04
Supra-littoral sediment	6.3	0.40
Littoral rock	3.0	0.10
Littoral sediment	30.2	1.40
TOTAL	2,110.1	100.00

**Source:** Countryside Survey, LCM2007.

Carboniferous Peat covers 3 per cent to 4 per cent of Wales and is predominantly acid blanket peat. There are small areas of raised bog and fen peat scattered in lowland areas.

Land use in Wales is dominated by farmland and grasslands, urban land accounts for 5% of the land area, and woodlands 14%. These characteristics reflect the climate, relief and soil type of Wales<sup>150</sup>.

The area designated as 'Best and Most Versatile' agricultural land accounts for approximately 7% of total land in Wales, which includes land of 'good to moderate' quality and above<sup>151</sup>.

A total of 10,130 potentially contaminated sites had been brought to the attention of local authorities in Wales, with 175 determined as 'contaminated land' in Wales by the end of 2013. The most common

<sup>150</sup> UNEP (2011) *UK National Ecosystem Assessment, Synthesis of Key Findings 2011*. Available online at: <http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx>

<sup>151</sup> Welsh Government (2016) *Agricultural Land Classification*. Available online at: <http://gov.wales/topics/environmentcountryside/farmingandcountryside/agricultural-land-classification/?lang=en>

## Land Use, Geology and Soils

contaminants were Benzo(a)pyrene, lead and arsenic, all of which were identified at over 60% of determined contaminated land sites<sup>152</sup>.

### 4.4 Summary of Existing Problems Relevant to the Water Resources NPS

The following existing problems for land use, geology and soils have been identified.

- there is a need to protect, maintain and enhance geomorphological functions and services;
- some 1.6% of land in the UK is contaminated from industrial activity, although this is progressively being cleaned up as sites are redeveloped. Whilst contamination is remediated during redevelopment, the process can be expensive;
- disturbance of contaminated sites carries the risk of pollution pathways being created or re-opened for any existing ground contamination;
- there is currently increasing pressure on rural and agricultural land from developers as urban areas expand. Future population growth leading to an increase in the need for housing and related urban development infrastructure will put more pressure on protected land including important geological sites;
- soils in England, Scotland and Wales continue to be degraded by human actions including intensive agriculture, historic levels of industrial pollution and urban development, making them vulnerable to erosion (by wind and water), compaction and loss of organic matter<sup>153</sup>. Appropriate management and control of soils and sediments is key to their long-term sustainability. Effects include:
  - ▶ loss of organic matter – soil organic matter underpins many soil functions. It is particularly important as a carbon store and thus has implications for climate change. The most recent evidence suggests relatively low rates of change in topsoil soil organic matter concentration; however, there is still uncertainty about the status and change in the soil organic matter stock;
  - ▶ sealing – there is no systematic data collection to capture the extent and the quality of land being sealed. It is essential that the value of soil functions is taken into account during development planning;
  - ▶ contamination – data on the extent and nature of soil contamination is limited. There is some evidence that some contaminant inputs and their impacts are reducing, for example from atmospheric acid deposition. However, many other potential soil contaminants such as organic chemicals are not routinely measured; change in soil biodiversity – soil biodiversity is essential to most ecosystem services. However, relatively little is known about the state and trend of Scotland's soil biodiversity except for a few protected soil-dwelling species; this is a major gap in our understanding of the contribution of soils to ecosystem services;

<sup>152</sup> Natural Resources Wales (2016) *The State of Contaminated Land in Wales*. Available online at: [https://naturalresources.wales/media/677708/nrw26759-contaminated-land-in-wales-pdf\\_english-1.pdf](https://naturalresources.wales/media/677708/nrw26759-contaminated-land-in-wales-pdf_english-1.pdf)

<sup>153</sup> Natural Scotland (2011) *The State of Scotland's Soil*. Available online at: <https://www.sepa.org.uk/media/138741/state-of-soil-report-final.pdf>

## Land Use, Geology and Soils

- ▶ erosion and landslides – soil erosion is one of the more visible of the threats to soil. Impacts include loss of soil carbon, loss of fertility and off-site effects such as impacts on the water environment. Landslides, although potentially life threatening, remain rare in Scotland;
  - ▶ compaction – the processes associated with soil compaction are broadly understood, but there is no systematic assessment of the extent and wider implications of soil compaction in Scotland; and
  - ▶ emerging issues – it is difficult to evaluate the potential impacts of emerging issues as there is little evidence currently available.
- as the climate (including temperature and rainfall patterns) changes in the future, it is likely that soils have the potential to be further degraded, as a result of increased seasonal aridity and wetness and variations in temperature<sup>154</sup>. Climate change and changes in land use are the most significant threats to Scottish soils<sup>155</sup>. The effect of industry, agricultural practices, forestry and climate change upon soils, particularly carbon rich peat soils, is also a key issue. Key pollutants include chemicals, oil or waste. Organic waste, including sewage sludge, is one of the main sources of heavy metal contamination of soils from humans;

## 4.5 Likely Evolution of the Baseline

### UK

#### Geology

As part of the JNCC Common Standards Monitoring for designated sites, the features for which certain sites are designated were assessed to determine site condition. For geological sites, the principal designations are GCRs and SSSIs, many of which occupy the same or part of the same area of land. Site attribute condition was compared with its target value, the outcome of which resulted in a site being classified as favourable, unfavourable, unfavourable-recovering, or destroyed (in whole or in part).

The increase in public and policy awareness regarding geological SSSI sites and Geoparks may lead to an increase in the number of sites protected and managed. As quarries come to the end of their working lives there is potential for their identification and conservation as geologically important sites.

#### Land Use and Soils

The estimated broad habitat type in the UK (Great Britain) and how it has changed from 1984 to 2007 was calculated by the Office of National Statistics<sup>156</sup> and is shown in **Table 4.5**. It shows that the area of land cover under arable and horticulture has decreased by 9.1% between 1998 and 2007. The area of grassland land cover has generally increased with improved grassland increasing by 5.7%. Built-up areas and gardens have increased by 3.4% between 1998 and 2007.

<sup>154</sup> UK Committee on Climate Change (2017) *UK Climate Change Risk Assessment*. Available online at: [http://www.gis.naturalengland.org.uk/pubs/gis/tech\\_aw.htm](http://www.gis.naturalengland.org.uk/pubs/gis/tech_aw.htm)

<sup>156</sup> ONS (2011) *Land cover account, Great Britain*. Available online at: <http://www.ons.gov.uk/ons/rel/environmental/environmental-accounts/2011/rftlandcover.xls>

## Land Use, Geology and Soils

Table 4.5 Estimated Area ('000 ha) of Broad Habitats in the UK (Great Britain) in 1984, 1990, 1998 and 2007

Land Type	1984	1990	1998	2007	% Change between 1998 and 2007
Broadleaved, mixed and yew woodland	1317	1343	1328	1406	5.9
Coniferous woodland	1243	1239	1386	1319	-4.8
Linear features	491	581	511	496	-2.9
Arable and horticulture	5283	5024	5067	4608	-9.1
Improved grassland	5903	4619	4251	4494	5.7
Neutral grassland	467	1669	2007	2176	8.4
Calcareous grassland	75	78	61	57	-6.6
Acid grassland	1476	1821	1503	1589	5.7
Bracken	439	272	315	260	-17.5
Dwarf shrub heath	1388	1436	1299	1343	3.4
Fen, Marsh, Swamp	428	427	426	392	-8.0
Bog	2303	2050	2222	2232	0.5
Standing open waters	284	200	196	204	4.1
Rivers and streams	70	70	65	58	-10.8
Montane	41	n/a	41	42	2.4
Inland rock	38	76	111	84	-24.3
Built-up areas and gardens	1268	1266	1279	1323	3.4
Other land	n/a	57	107	113	n/a
Unsurveyed land	n/a	522	522	522	n/a
<b>Total</b>	<b>22,514</b>	<b>22,632</b>	<b>22,601</b>	<b>22,627</b>	

**Source:** Countryside Survey 2007.

**Note:** Standing open waters and rivers and streams broad habitats are calculated using a different statistical model to the other broad habitats. The land in urban areas from within Great Britain was excluded from the estimation of broad habitats. The totals are therefore not equal to the sum of the column.

It is not known whether the decrease in arable and increase in improved grassland is likely to continue at the same rate in the future although it does seem likely that the extent of built up areas will continue to increase as some development will inevitably take place on greenfield land.

The total area of agricultural land across the UK has declined slightly over the last 30 years from 18,753 thousand hectares in 1984 to 18,428 thousand hectares in 2015 (a reduction of 1.7%)<sup>157</sup>. This area includes

<sup>157</sup>Defra (2016) *Agriculture in the UK: Datasets, Chapter 2*. Available online at: <https://www.gov.uk/government/statistical-data-sets/agriculture-in-the-united-kingdom>

## Land Use, Geology and Soils

arable and horticultural crops, uncropped arable land, common rough grazing, temporary and permanent grassland and land used for outdoor pigs.

The clearest trend in land use change in the UK over the past quarter of a century has been the conversion of land from agriculture to forestry and woodland. Forestry Commission estimates of the area of forest and woodland cover in the UK imply an average annual net increase of 28,000 hectares from 1980 to 2016, equivalent to 0.11% increase in total UK land cover per year. This follows on from a slower but steady increase in woodland cover from the early 1900s onwards, and there has overall been a doubling of the area of UK woodland since World War II to reach 3.16 million hectares in 2016<sup>158</sup>.

New planting has predominantly responded to subsidy and has involved the expansion of small broadleaved woodlands within agricultural holdings. The average annual increase in woodland on farms (14,500 hectares per annum) accounts for more than half of the net increase in the wooded area as a whole. The area of woodland within agricultural holdings has thus more than doubled since the early 1980s<sup>159</sup>.

A number of threats to the UK soil resource have been recognised in England, Scotland and Wales including:

- loss of soil organic matter and erosion;
- climate change;
- loss of soil biodiversity;
- structural degradation and compaction;
- contamination;
- loss of soil to development (e.g. soil sealing), including urbanisation and agriculture; and
- threat to soil as a cultural resource (e.g. archaeological protection and UK environmental records).

UK soils store around 10 billion tonnes of carbon<sup>160</sup>. A study by the National Soil Inventory (NSI) found that between 1978 and 2003 there was a loss in soil organic carbon of 0.6% per year for all soil types, though with higher losses (2% per year) in those which are particularly organic rich<sup>161</sup>. However, between 1990 and 2014, the UK has gone from being a net source of Land Use, Land Use Change and Forestry (LULUCF) emissions to a net sink driven by land converted to cropland and forest land, with an increasing uptake of CO<sub>2</sub> by trees as they reach maturity, in line with the historical planting pattern<sup>162</sup>.

Future projections of LULUCF GHG emissions and removals do not include a climate component because of fundamental uncertainties, even with regard to present-day conditions. Enhanced storage of carbon due to a longer growing season and CO<sub>2</sub> fertilisation<sup>163</sup> is likely to be countered by a loss of carbon from enhanced soil respiration due to higher temperatures. At present, it is difficult to evaluate which will be the dominant process and it will also depend on changes in soil water regimes. Nevertheless, in currently vulnerable areas

<sup>158</sup> Forestry Commission (2016) *Forestry Statistics 2016: Chapter 1*. Available online at:

[http://www.forestry.gov.uk/pdf/Ch1\\_Woodland\\_FS2016.pdf/\\$FILE/Ch1\\_Woodland\\_FS2016.pdf](http://www.forestry.gov.uk/pdf/Ch1_Woodland_FS2016.pdf/$FILE/Ch1_Woodland_FS2016.pdf)

<sup>159</sup> Bibby, P. (2009) *Land Use Change in Britain. Land Use Policy*, 26S, S2–S13.

<sup>160</sup> Defra (2009) *Safeguarding our Soils – A Strategy for England*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69261/pb13297-soil-strategy-090910.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69261/pb13297-soil-strategy-090910.pdf)

<sup>161</sup> Bellamy PH, Loveland PJ, Bradley RI, Lark RM and Kirk GJD (2005) *Carbon Losses from all Soils across England and Wales 1978–2003. Nature* 437: 245–248. Available online at:

<http://core.ac.uk/download/pdf/141023.pdf>

<sup>162</sup> DECC (2016) *2014 UK Greenhouse Gas Emissions, Final Figures*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/496942/2014\\_Final\\_Emissions\\_Statistics\\_Release.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/496942/2014_Final_Emissions_Statistics_Release.pdf)

<sup>163</sup> The CO<sub>2</sub> fertilisation effect is the principle that the increase of carbon dioxide in the atmosphere increases the rate of photosynthesis in plants.

## Land Use, Geology and Soils

(e.g. unvegetated or degraded peat), higher temperatures and the likelihood of drier summers, particularly in the eastern side of the UK, would be likely to substantially increase the loss of carbon stocks. Hence, the role of land management in enhancing soil resilience, by maintaining peat-forming vegetation cover for example, or limiting tillage during cultivation, will be important for both climate adaptation and mitigation objectives<sup>164</sup>.

Compaction may result from a number of activities including intensive mechanised agriculture, poor timing of cultivation, over-stocking and overworking of land. The result is a reduced plant yield, habitat loss for larger fauna, NO<sub>2</sub> losses, reduced water holding and soil infiltration capacity and an increased risk of flooding and erosion. The principal causes of accelerated erosion (i.e. that which exceeds background levels) in England, Wales and Scotland are:

- intensive cultivation - particularly where compacted by machinery and left open to rain;
- trampling by animals;
- poor forestry practice (e.g. during road construction and harvesting); and
- run-off from urban land surfaces.

Other causes include wind erosion, tillage losses and soil co-extracted with root vegetables<sup>165</sup>. The rate of soil erosion due to agriculture is thought to have remained relatively stable across the period 1969 to 2010<sup>166</sup>.

Soil chemical and biological processes are controlled by a complex set of factors, but most importantly by the balance between soil temperature and soil moisture. Temperature is a key factor that can control many terrestrial biogeochemical processes. Soils processes, properties and functions are therefore all sensitive to changes in climatic conditions.

Future changes in temperature and precipitation could potentially have considerable impacts on soils and their biodiversity. Rising atmospheric concentrations of CO<sub>2</sub>, are also likely to influence soils indirectly, via changes in plant growth. There is a high degree of uncertainty about how climate change will affect soils in the UK due to limitations on the current evidence and the difficulties of distinguishing the role of climate from other factors. Nevertheless, the majority of climate projections imply a trend towards reductions in soil moisture, most notably in the eastern districts of the UK, due to an increased frequency of warmer, drier summers. The consequent changes in soil water regimes will be highly dependent on soil type and, in combination with elevated temperatures and CO<sub>2</sub> levels, will have an impact on rates of soil physical, biological and chemical processes, and hence on soil function and ecosystem services<sup>167</sup>.

Land use including agriculture and building work have the potential to disturb archaeological contexts, which if not appropriately studied, could be damaged. Since the middle of the last century in England, 23,500 ancient monuments have been destroyed, with a total 10% destroyed and 30% damaged by agricultural

<sup>164</sup> UK Committee on Climate Change (2017) *UK Climate Change Risk Assessment*. Available online at:

[http://www.gis.naturalengland.org.uk/pubs/gis/tech\\_aw.htm](http://www.gis.naturalengland.org.uk/pubs/gis/tech_aw.htm)

<sup>165</sup> Quine TA Van Oost K, Walling DE and Owens PN (2006) *Development and Application of GIS-Based Models to Estimate National Rates of Soil Erosion by Tillage, Wind and Root Crop Harvest*. University of Exeter Report to Defra, Project SP08007, University of Exeter, UK, 59pp. Available online at:

[http://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CCIOFjAA&url=http%3A%2F%2Frandd.defra.gov.uk%2FDocument.aspx%3FDocument%3DSP08007\\_6584\\_FRA.pdf&ei=mBdnVdaOC4X2UvaVgPgK&usq=AFQjCNEcGiVgzMhyX0jjAa1ghaPkRmpA-Q&bvm=bv.93990622,d.d24](http://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CCIOFjAA&url=http%3A%2F%2Frandd.defra.gov.uk%2FDocument.aspx%3FDocument%3DSP08007_6584_FRA.pdf&ei=mBdnVdaOC4X2UvaVgPgK&usq=AFQjCNEcGiVgzMhyX0jjAa1ghaPkRmpA-Q&bvm=bv.93990622,d.d24)

<sup>166</sup> Cranfield University (2015) *Research to develop the evidence base on soil erosion and water use in agriculture: Final Technical Report*. Available online at:

<https://www.theccc.org.uk/wp-content/uploads/2015/06/Cranfield-University-for-the-ASC.pdf>

<sup>167</sup> UK Committee on Climate Change (2017) *UK Climate Change Risk Assessment*. Available online at:

[http://www.gis.naturalengland.org.uk/pubs/gis/tech\\_aw.htm](http://www.gis.naturalengland.org.uk/pubs/gis/tech_aw.htm)



## Land Use, Geology and Soils

practices. Around 3,000 Scheduled Monuments are actively ploughed, and a third of all sites are on ploughed land, with 2% at high risk. In Wales, 15% of Scheduled Monuments have deteriorated due to natural, agricultural and other causes<sup>168</sup>. In Scotland, there is a lack of monitoring with regard to issues relating to the preservation of archaeological features, and indeed the extent and distribution of cultural soils. In addition, there is a general lack of data on changes in soil condition which may influence preservation conditions.

As there are now more stringent statutory controls on land contamination and remediation, increased areas of historic contamination are being remediated and fewer areas are being left in a contaminated state following decommissioning of commercial and industrial sites.

There are a number of European directives that are being implemented that may influence the way in which land contamination is managed in the future (i.e. the Environmental Liabilities, Water, Groundwater and the Waste Framework Directives). The implementation of these regimes into UK legislation is likely to affect how contaminated land is dealt with.

## England

### Geology

Natural England<sup>169</sup> has identified the following key threats to geology (which are also equally applicable to Scotland and Wales):

- inappropriate development;
- natural degradation;
- irresponsible specimen collecting; and
- irresponsible recreational activities.

### Land Use and Soils

**Figure 4.1** shows the origin and proportion of non-previously developed land lost to residential development for each year from 1995 to 2014/15 for England. In 2013/14 and 2014/15, there was a notable rise in the proportion of undeveloped land being converted to residential use, with a corresponding decrease in previously developed land being used for residential development. Overall, the amount of soil lost to residential development (including previously developed land) gradually decreased from nearly 5,800 hectares in 1995 to 2,200 hectares in 2009 and has since risen substantially to 4,800 hectares in 2014/15.

<sup>168</sup> Environment Agency (2004) *The state of soils in England and Wales*. Available online at:

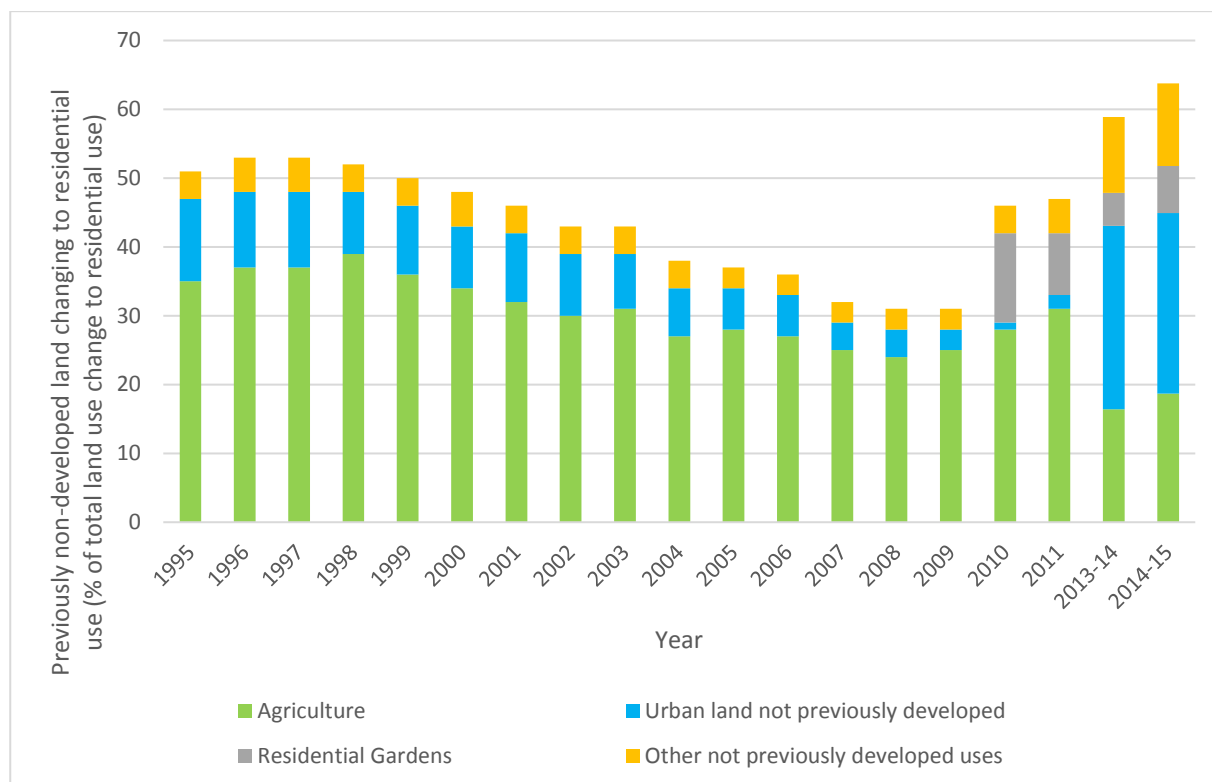
[http://www.adlib.ac.uk/resources/000/030/045/stateofsoils\\_775492.pdf](http://www.adlib.ac.uk/resources/000/030/045/stateofsoils_775492.pdf)

<sup>169</sup> Natural England. *What are the threats to geology?* Available online at:

<http://webarchive.nationalarchives.gov.uk/20140605090108/http://www.naturalengland.org.uk/ourwork/conservation/geodiversity/threats/default.aspx>

## Land Use, Geology and Soils

Figure 4.1 Soils Lost to Residential Development (England)



**Source:** DCLG. Live tables on land use change statistics: Land use change statistics - live tables 2014 to 2015. Note data gap from 2011 to 2013/14.

In 2010, there was an estimated 68,910 hectares of previously developed land in England, up 11% from 61,920 hectares in 2009<sup>170</sup>. The conversion of previously undeveloped land to developed land decreased from 7,530 hectares in 2000 to 2,180 hectares in 2011, before rising sharply to 21,446 hectares in 2014/15 and reducing to 15,405 in 2015/16. In 2015/16, 7% of the land changing to residential use was in Flood Zone 3. It is not known what proportion of the land was within Flood Zone 3a and what was within Flood Zone 3b<sup>171</sup>.

There have also been changes to land use related to broad habitat types. Between 1998 and 2007 in England there was a significant increase in the area of Broadleaved Woodland (5.8%), Neutral Grassland (12.6%), Dwarf Shrub Heath (15.1%) and Standing Open Water and Canals (5.3%).

The increase in the area of Dwarf Shrub Heath between 1998 and 2007 followed a decrease in area between 1990 and 1998. The increase in the area of Standing Open Water and Canals recorded in England between 1998 and 2007 continued the increases recorded by Countryside Survey since 1990. On the other hand, there was a significant decrease in the area of Arable and Horticulture Broad Habitat (8.8%) in England across the same period.

No statistical change in extent was detected in the Coniferous Woodland, Improved Grassland, Bracken, Bog, Fen, Marsh and Swamp and Calcareous Grassland Broad Habitats in England between 1998 and 2007<sup>172</sup>.

<sup>170</sup> Defra (2013) *National Land Use Database PDL – Results and Analysis*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/366838/NLUD\\_2010\\_Summary\\_Headline\\_Report.doc](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/366838/NLUD_2010_Summary_Headline_Report.doc)

<sup>171</sup> DCLG (2017) *Live tables on land use change statistics: Land use change statistics - live tables 2015 to 2016*. Available online at:

<https://www.gov.uk/government/statistical-data-sets/live-tables-on-land-use-change-statistics>

<sup>172</sup> Countryside Survey (2007) *England Results from 2007*. Available online at:

## Land Use, Geology and Soils

The loss of organic matter from soils influences its structure and is linked to erosion and soil compaction, reduced agricultural productivity and soil biodiversity. Since 1980 there has been an estimated average loss in organic matter in England and Wales of:

- 15% in arable soils and rotational grass soils;
- 16% in soils under permanently managed grassland; and
- 23% in agriculturally managed soils and semi-natural land<sup>173</sup>.

17% of soils in England and Wales show signs of erosion which leads to a reduction in water retention and filtering, and the mobilisation of sediment (which may contain pesticides, nutrients and metals) to watercourses or floodplains<sup>174</sup>.

In the 2012 Farm Practices Survey for England<sup>175</sup>, 20% of farmers stated that they had experienced soil compaction throughout the soil profile. For the 12 months leading up to August 2012, the Farm Practices Survey 2012 indicated that the most common actions taken to reduce compaction were removing compaction from headlands after harvest, enhancing drainage, using low pressure set-ups and crop rotation.

Key objectives and targets within the Soil Strategy for England (Safeguarding Our Soils) include:

- to undertake further research in areas including best practices to protect and enhance levels of soil organic matter, contribution of soil management to flood mitigation and best practices to prevent and remediate soil degradation;
- to significantly reduce the rate of loss of stored soil carbon by 2020;
- to halt the decline of soil organic matter caused by agricultural practices in vulnerable soils by 2025; and
- to introduce a reviewed Soil Protection Review to make it a more effective tool for soil management.

The Natural Environment White Paper (2011) established an ambition that by 2030 all of England's soils will be managed sustainably and degradation threats tackled successfully, in order to improve the quality of soils and to safeguard their ability to provide essential ecosystem services and functions for future generations.

## Scotland

### Geology

No further information has been identified beyond those issues identified for the UK.

<http://www.countrysidesurvey.org.uk/content/england-results-2007>

<sup>173</sup> Defra (2006) *Sustainable Farming and Food Strategy – Indicator Data Sheet. Headline Indicator H5: Soil Quality – Soil Organic Matter*. Available online at:

[http://webarchive.nationalarchives.gov.uk/20080726153624/https://statistics.defra.gov.uk/esg/indicators/h5\\_data.htm](http://webarchive.nationalarchives.gov.uk/20080726153624/https://statistics.defra.gov.uk/esg/indicators/h5_data.htm)

<sup>174</sup> Environment Agency (2004) *The state of soils in England and Wales*. Available online at:

[http://www.adlib.ac.uk/resources/000/030/045/stateofsoils\\_775492.pdf](http://www.adlib.ac.uk/resources/000/030/045/stateofsoils_775492.pdf)

<sup>175</sup> Defra (2012) *Farm Practices Survey Autumn 2012 - England*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/181719/defra-stats-foodfarm-envirom-fps-statsrelease-autumn2012edition-130328.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/181719/defra-stats-foodfarm-envirom-fps-statsrelease-autumn2012edition-130328.pdf)

## Land Use, Geology and Soils

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### Land Use and Soils

Scotland's land cover has been studied in both the Countryside Survey and by the National Countryside Monitoring Scheme (NCMS). The latter study is arguably outdated, being based on aerial photography interpretation with the last dataset dating to 1988. The principal findings with regard to this section include, since the 1940s<sup>176</sup>:

- Built land increased by 46% mainly on grassland and farmland;
- Recreational land increased by 138%;
- Bare ground increased four-fold due to peat extraction and urban road development;
- Transport corridors increased by 22%; and
- Upland surfaced tracks increased by 29%.

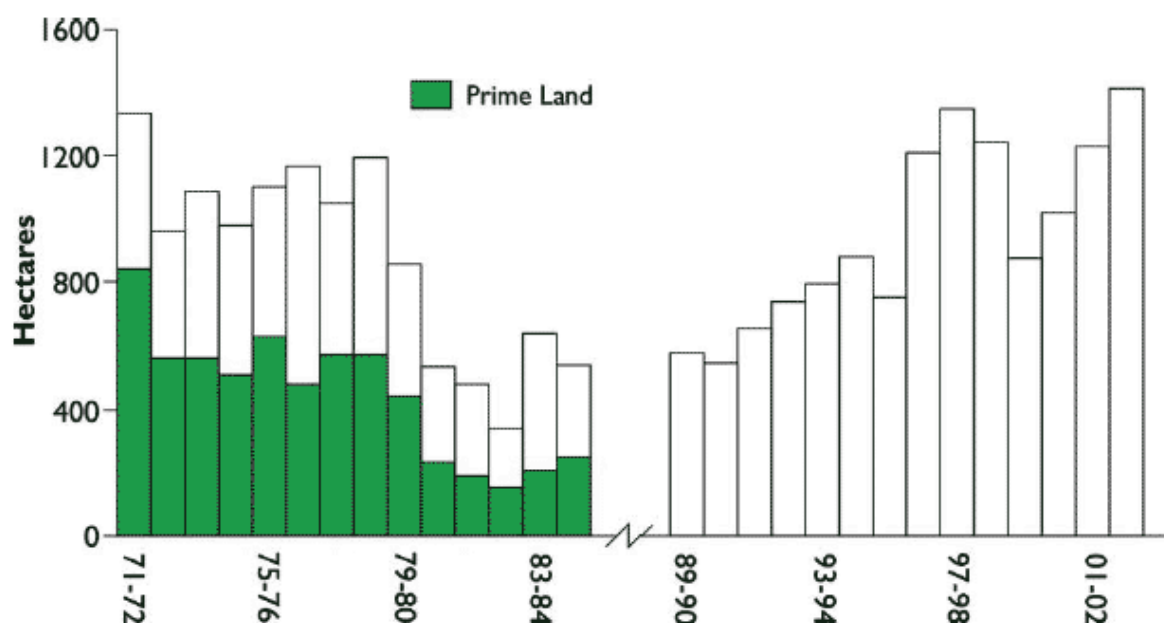
**Figure 4.2** indicates the area of agricultural land in Scotland lost to development over the last 30 years, which has been recently increasing.

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<sup>176</sup> Scottish Natural Heritage. *Land Cover Change in Scotland*. Available online at: <http://www.snh.org.uk/publications/on-line/education/advances5/5-land-cover-change.asp>

## Land Use, Geology and Soils

Figure 4.2 Conversion of Agricultural Land (Scotland)



Source: Scottish Government

The total amount of derelict and urban vacant land has decreased in each year between 2010 and 2016 (annual decreases ranging from 0.2% to 3%), except for 2014 when there was an increase of 2,090 hectares (19%) compared to 2013, largely due to over 2,200 hectares of former surface coal mine sites in East Ayrshire that had become derelict following the liquidation of Scottish Coal and ATH Resources in 2013. The total amount of derelict and urban vacant land in Scotland has decreased by 253 hectares (2%) in the latest year, from 12,688 hectares in 2015 to 12,435 hectares in 2016<sup>177</sup>.

The 2007 Countryside Survey identified that the area of Broadleaved Woodland, Improved Grassland and Acid Grassland Broad Habitats increased by 9.5% in Scotland between 1998 and 2007. There was a corresponding decrease of 7.1% in the area of Coniferous Woodland. The area of the Arable and Horticulture Broad Habitat decreased by 13.6% between 1998 and 2007. There was a corresponding increase of 9.1% in the area of Improved Grassland, but no significant increase in the area of Neutral Grassland across Scotland as a whole. The changes in the areas of Broad Habitats in Scotland reflect short-term influences, such as agricultural economics, and medium-term influences, such as woodland planting and harvesting<sup>178</sup>.

Scotland's Land Use Strategy for 2016-2021 takes a strategic approach to the challenges facing land use in Scotland and sets out the following vision: "A Scotland where we fully recognise, understand and value the importance of our land resources, and where our plans and decisions about land use deliver improved and enduring benefits, enhancing the wellbeing of our nation." Overall, the Scottish Government concludes that in the future, the challenges facing Scotland's soil will be to understand and deal with a number of issues including:

- the need for policy integration: understanding the role of soil in existing policy and developing recommendations for future soil policy to ensure soil is sufficiently protected;

<sup>177</sup>The Scottish Government (2017) *Scottish Vacant and Derelict Land Survey 2016*. Available online at: <http://www.gov.scot/Resource/0051/00516905.pdf>

<sup>178</sup> Countryside Survey (2007) *Scotland Results from 2007*. Available online at: <http://www.countryside-survey.org.uk/content/scotland-results-2007>

## Land Use, Geology and Soils

- tackling the lack of systematic Scottish soil data: understanding what information is already available, identifying gaps and making recommendations for future soil monitoring; and
- understanding soil management and providing recommendations for targeting practical management options to minimise soil degradation and its consequences<sup>179</sup>.

## Wales

### Geology

No further information has been identified beyond those issues identified for the UK.

### Land Use and Soils

In Wales, between 1998 and 2007 the area of built land has increased by 12.5%. Most Broad Habitats did not change significantly in area between 1998 and 2007 when averaged across Wales as a whole. However, a number of statistically significant changes in area have been noted between 1998 and 2007. In the lowland zone of Wales Broadleaved, Mixed and Yew Woodland increased, and in the upland zone, Arable and Horticultural Land increased, Neutral Grassland decreased and Acid Grassland increased. The possible drivers of these changes are unknown and require further research<sup>180</sup>.

No baseline data has been identified in relation to previously developed land in Wales and therefore trends could not be established. However, similar to recent trends in England, the trend in land use may be generally towards increased development on land that has not previously been developed.

## 4.6 Assessing Significance

The objectives and guide questions related to land use, geology and soils which have been identified for use in the appraisal of the effects of Water Resources NPS proposals are set out in **Table 4.6**, together with reasons for their selection.

Table 4.6 Approach to Assessing the Effects of the Water Resources NPS on Land Use, Geology and Soils

Objective/Guide Question	Reasoning
<b>Objective: To conserve and enhance soil and geology and contribute to the sustainable use of land.</b>	<p>The SEA Directive (2001/42/EC) requires that likely significant effects on soil and resources be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.</p> <p>The construction of water resources infrastructure can affect land use and soil. Impacts may be direct (for example, the loss of, or damage to, land and soil from new development) or indirect (for example, location of new infrastructure affecting adjacent land uses). The inclusion of this AoS objective ensures that these effects can be considered within the AoS.</p>
Will the Water Resources NPS have an effect on soil quality/function, variety, extent and/or compaction levels?	<p>Loss of soil quality, variety, extent or an increase in soil compaction will lead to degradation of soil.</p> <p>The European Thematic Strategy on Soil Protection seeks the protection and sustainable use of soil, preventing soil degradation and ensuring restoration of</p>

<sup>179</sup> Scottish Government (2017) *Soils*. Available online at:

<http://www.environment.scotland.gov.uk/get-informed/land/soils/>

<sup>180</sup> Countryside Survey (2007) *Wales Results from 2007*. Available online at:

<http://www.countryside-survey.org.uk/content/wales-results-2007>

## Land Use, Geology and Soils

Objective/Guide Question	Reasoning
	degraded soils.
Will the Water Resources NPS increase the risk of significant land contamination?	Environment Act 1995 seeks to protect and preserve environment against pollution to land. The Soil Strategy for England (2009) and Scottish Soil Framework (2009) include objectives on reducing/preventing soil pollution and contamination.
Will the Water Resources NPS have an effect on any known and existing contamination?	Significant areas of the UK carry a burden of contamination from industrial activity. Disturbance of contaminated sites carry the risk of pollution pathways being created or re-opened for existing ground contamination.
Will the Water Resources NPS protect and/or enhance Geological Conservation Sites, important geological features and geophysical processes and functions?	National planning policy in England, Scotland and Wales seeks to protect and enhance geological conservation interests.
Will the Water Resources NPS change patterns of land use including or affect best and most versatile agricultural land?	National and local planning policies set out that planning should use of previously developed land where possible, and avoid using best and most versatile land.

**Table 4.7** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the land use, geology and soils objective.

## Land Use, Geology and Soils

Table 4.7 Illustrative Guidance for the Assessment of Significance for Land Use, Geology and Soils

Effect	Description	Illustrative Guidance
++	Significant positive	<ul style="list-style-type: none"> <li>Option would restore and significantly improve soil quality and land stability to conditions beyond current levels and remove all soil contamination so that soil functions and processes would be significantly improved in the long term;</li> <li>Option would minimise the use of, and protect from irreversible damage, high quality agricultural land;</li> <li>Option would have a significant and sustained positive impact on national designated geological sites;</li> <li>Option would seek to minimise the use of any undeveloped land, and look to preferentially reclaim and redevelop significant areas of previously developed or derelict land.</li> </ul>
+	Positive	<ul style="list-style-type: none"> <li>Option would generate minor improvements in soil quality and land stability and would remove some soil contamination so that soil functions and processes would be improved in the long term;</li> <li>Option would reduce any potential damage to high quality agricultural land;</li> <li>Option would reduce any potential hazard associated with existing soil contamination;</li> <li>Option would have a minor and temporary positive impact on a national designated geological site;</li> <li>Option would seek to preferentially make use of previously developed land.</li> </ul>
0	Neutral	<ul style="list-style-type: none"> <li>Option would not significantly affect potential hazards associated with any existing contamination;</li> <li>Option would not cause damage or loss to soil such that soil function and processes would not be affected;</li> <li>Option would not affect land stability;</li> <li>Option would not involve significant loss of any undeveloped or developed land.</li> </ul>
-	Negative	<ul style="list-style-type: none"> <li>Option would lead to an increase in pollutant discharges to soil; however, these would be less than permitted limits, such that there would be minor short-term increases in land contamination;</li> <li>Option would cause minor increases in potential hazards associated with existing soil contamination;</li> <li>Option would cause minor increases in potential hazards associated with land stability;</li> <li>Option would cause a temporary loss of soil so that soil function and processes would be negatively affected in the short/medium term;</li> <li>Option would cause minor short-term negative effects on geological conservation sites/important geological features or soils of high importance;</li> <li>Option would lead to the majority of development using undeveloped land or land that has reverted to a 'wild' state.</li> </ul>



## Land Use, Geology and Soils

Effect	Description	Illustrative Guidance
--	Significant negative	<ul style="list-style-type: none"> <li>Option would lead to a statutory limit being reached or exceeded in relation to land contamination, such that there would be a major and sustained increase in land contamination;</li> <li>Option would cause major and sustained increases in potential hazards associated with existing soil contamination;</li> <li>Option would cause major increases in potential hazards associated with land stability;</li> <li>Option would cause considerable loss of soil quality, such that soil function and processes would be irreversibly and significantly affected;</li> <li>Option would cause a substantial and permanent loss of, or damage to, soil of high importance (such as best and most versatile agricultural land) and/or designated geological conservation sites/important geological features;</li> <li>Option would not develop derelict or previously developed land, but would lead to development of significant areas of undeveloped land/ land that has reverted to a 'wild' state.</li> </ul>
?	Uncertain	<ul style="list-style-type: none"> <li>From the level of information available, the effect that the option would have on this objective is uncertain.</li> </ul>

## Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 4.8** presents the appraisal of the likely significant effects of the draft NPS and the 'no NPS' reasonable alternative on the Land use, Geology and Soils objective. The appraisal considers in-turn the three subsections used for each topic within Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making and Mitigation. Land use is considered as a stand-alone topic in Section 5 of the draft NPS. Geology and soils are considered under different sections. The performance of the draft NPS and the 'no NPS' reasonable alternative are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters 1 – 3 of the draft NPS outlining how the remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the two reasonable alternatives is then summarised along with any proposed mitigation measures.

## Land Use, Geology and Soils

Table 4.8 Appraisal of the Draft NPS and Reasonable Alternatives: Land Use, Geology and Soils

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	+	+/?	<p><b>Draft NPS:</b> The text in the draft NPS under 'Applicant's Assessment' states:</p> <p><b>Land Use</b></p> <p>4.10.8 "The applicant should identify existing and proposed land uses near the project, including any effects of replacing an existing development or use of the site with the proposed project or preventing a development or use on a neighbouring site from continuing. The applicant should also assess any effects of precluding a new development or use proposed in the development plan. The assessment should be proportionate to the scale of the preferred scheme and its likely impacts on such receptors. For developments on previously developed land, the applicant should ensure that they have considered the risk posed by land contamination and how it is proposed to address this."</p> <p>4.10.9 "Existing open space, sports and recreational buildings and land should not be developed unless the land is no longer needed or the loss would be replaced by equivalent or better provision in terms of quantity and quality in a suitable location. If the applicant is considering proposals which would involve developing such land, it should have regard to any local authority's assessment of need for such types of land and buildings and consult with the local community."</p> <p>4.10.11 "...The applicant should therefore determine whether the proposal, or any part of it, is within the Green Belt and, if so, whether its proposal may be considered inappropriate development within the meaning of Green Belt policy. Metropolitan Open Land and land designated a Local Green Space in a local or neighbourhood plan are subject to the same policies of protection as Green Belt, and inappropriate development should not be approved except in very special circumstances".</p> <p><b>Geology</b></p> <p>4.10.13 "Where required, a preliminary assessment of ground instability should be carried out at the earliest possible stage. Applicants should ensure that any necessary investigations are undertaken to ascertain that the site is and will remain stable or can be made so as part of the development. The site needs to be assessed in context of surrounding areas where subsidence, landslides and land compression could threaten the development during its anticipated life or damage neighbouring land or property. Risks to groundwater resources should also be assessed. This could be in the form of a land stability or slope stability risk assessment report."</p>

## Land Use, Geology and Soils

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>4.10.14 "The applicant should identify and assess any impacts the proposed project may have for mineral safeguarded areas (or other minerals supply aspects) with the relevant Mineral Planning Authority."</p> <p><b>Soils</b></p> <p>4.10.12 "Applicants should seek to minimise impacts on the best and most versatile agricultural land...applicants should use poorer quality land (grades 3b, 4 and 5) where possible to minimise impacts on soil quality (except where doing so would be inconsistent with other sustainability considerations). Applicants should also identify any effects on soil quality and show how they would minimise those effects, including by proposing appropriate mitigation measures"</p> <p>The requirement for effects on land use, geology and soils to be assessed and mitigation measures identified should help to reduce adverse effects arising from the construction and operation of water resources infrastructure. Taking into account the wide range of factors/impact considerations identified in this section, overall a positive effect has been identified in respect of this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>Reference could also be made to the Planning Practice Guidance (PPG) (under Natural Environment) in relation to soils which states that "the planning system should protect and enhance valued soils and prevent the adverse effects of unacceptable levels of pollution. This is because soil is an essential finite resource that provides important 'ecosystem services'".</p> <p>This section could encourage applicants to identify opportunities for enhancing open space and green infrastructure as part of development proposals (for example, through improved access to blue infrastructure such as reservoirs, improved coastal access and the provision of recreational facilities at sites).</p> <p>Given the potential scale and locations of some types of water resources infrastructure (such as new reservoirs), the draft NPS could be amended to require a Soil Management Plan. This would give specific consideration to the management of soil as a resource (rather than 'waste'). The Plan would need to be site specific, identifying the best way to manage/use materials. The draft NPS could encourage the use of materials on site first, in order to reduce the need to transport material. This could be particularly relevant where proposals are located on best and most versatile agricultural land.</p> <p>As part of the Government's 'Safeguarding our Soils' strategy, Defra has published a code of practice on the sustainable use of soils on construction sites, which may be helpful in development planning conditions. The applicant could be asked to develop their applications in light of this and other more detailed guidance, for example:</p> <ul style="list-style-type: none"> <li>Defra and Environment Agency (EA), CLR 11: Model Procedures for the Management of Land Contamination;</li> </ul>

## Land Use, Geology and Soils

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>• BS 3882:2015: Specification for topsoil and requirements for use;</li> <li>• BS 6031:2009 Code of Practice for Earth Works;</li> <li>• BS 10175:2011+A2:2017: Investigation of Potentially Contaminated Sites. Code of Practice;</li> <li>• CIRIA Report C741: Environmental Good Practice on Site (fourth edition).</li> </ul> <p>There is no detailed guidance on the potential contents that should form part of the ES. It would be useful to supplement the current information with equivalent guidance. Specification of the contents of the ES could be drawn from the following which in turn serves as the reference point for the detail of the 'Decision Making' section:</p> <ul style="list-style-type: none"> <li>• Scoping <ul style="list-style-type: none"> <li>○ Identify the likely zone of influence of the proposed development.</li> <li>○ Identify and evaluate existing land uses/marine activity, geology and soils within the study area, including reference to agricultural land classifications.</li> <li>○ Describe any future anticipated changes to baseline conditions (including proposed land uses) in the absence of the proposed project, to inform the assessment of impacts.</li> <li>○ Provide the basis for determining significance of effects arising from the impacts.</li> </ul> </li> <li>• Impact assessment <ul style="list-style-type: none"> <li>○ Assess whether receptors will be subject to impacts and characterise these impacts and their effects (including scale, duration and significance), taking account of temporary and permanent land-use requirements and site restoration.</li> <li>○ Assess the residual impacts of the project remaining after mitigation and the significance of their effects, including cumulative effects.</li> </ul> </li> <li>• Avoidance, mitigation, compensation and enhancement <ul style="list-style-type: none"> <li>○ Identify and incorporate measures to avoid, reduce and compensate impacts on land use, geology and soils, and the provision of enhancements including environmental net gain.</li> </ul> </li> </ul>

## Land Use, Geology and Soils

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.</li> </ul>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of extant national planning policy and the EIA Regulations which require consideration of the effects of development proposals on land use, geology and soils. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on land use, geology and soils. In consequence, even without the draft NPS, this alternative would still be considered to have a positive effect in relation to this AoS objective. However, the opportunity for the draft NPS to provide clarity and further guidance would be lost in the absence of the draft NPS.</p>
Decision Making	+	+/?	<p><b>Draft NPS:</b> The text in the draft NPS under 'Decision Making' states:</p> <p><b>Land use</b></p> <p>4.10.15 "Where the proposed development conflicts with a proposal in a development plan, the Secretary of State should take account of the stage which the development plan document in England has reached."</p> <p>4.10.16 "The Secretary of State should not grant consent for development on existing open space, land used for sports and recreational buildings and for other sports and recreational purposes including playing fields, unless an assessment has been undertaken either by the local authority or independently, which has shown the open space and the buildings and/or land to be no longer needed, or the Secretary of State determines that the benefits of the project (including need) outweigh the potential loss of such facilities, taking into account any positive proposals made by the applicant to provide new, improved or compensatory land or facilities"</p> <p>4.10.17 "Where networks of green infrastructure have been identified in development plans, they should normally be protected from development and, where, possible, strengthened by or integrated within it."</p> <p>4.10.19 "When located in the Green Belt, projects may comprise inappropriate development...The Secretary of State will need to assess whether there are very special circumstances to justify inappropriate development...The Secretary of State may require the provision of replacement Green Belt land, which should be secured by the applicant."</p> <p><b>Geology</b></p>

## Land Use, Geology and Soils

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>4.10.21 "Where the development has an impact on a mineral safeguarding area, the Secretary of State must ensure that the applicant has put forward appropriate mitigation measures to safeguard mineral resources"</p> <p><b>Soils</b></p> <p>4.10.18 "The Secretary of State will take into account the economic and other benefits of the best and most versatile agricultural land, and ensure the applicant has put forward appropriate mitigation measures to minimise impacts on soils or soil resources"</p> <p>4.10.20 "In considering the impact on maintaining coastal recreation sites and features, the Secretary of State should expect an applicant to have taken advantage of opportunities to maintain and enhance access to the coast. In doing so, the Secretary of State should consider the implications of development for the creation of a continuous signed and managed route around the coast, as provided for in the Marine and Coastal Access Act 2009."</p> <p>Given the range of factors/impacts considerations relating to land use and soils identified in the context of the decision making criteria, the draft NPS is assessed as having a positive effect against this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>Whilst it is noted that paragraph 4.10.20 includes reference to coastal access, reference could be usefully included to impacts on existing or proposed marine activities.</p> <p>This section could also include specific decision making criteria in relation to existing land uses.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of nationally planning policy and the EIA Regulations which require consideration of the effects on land use, geology and soils. In addition, proposals would continue to be identified through the WRMP process which would include the consideration of effects on land use, geology and soils. In consequence, even without the NPS, this alternative would still be considered to have a positive effect in relation to this AoS objective. However, the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level.</p>
<b>Mitigation</b>	<b>+</b>	<b>+/?</b>	<p><b>Draft NPS:</b> The text in the draft NPS under 'Mitigation' states:</p> <p><b>Land use</b></p>

## Land Use, Geology and Soils

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>4.10.22 "The applicant can minimise the direct effects of a project on the existing use of the proposed site, or proposed uses near the site, by the application of good design principles, including the layout of the project and the protection of soils during construction"</p> <p>4.10.23 "Where green infrastructure is affected, the applicant should aim to ensure the functionality and connectivity of the green infrastructure network is maintained and any necessary works are undertaken, where possible, to mitigate any adverse impact and, where appropriate, to improve that network and other areas of open space, including appropriate access to National Trails and other public rights of way"</p> <p>4.10.24 "The Secretary of State must also consider whether mitigation of any adverse effects on green infrastructure or open space is adequately provided for by means of requirements, planning obligations, or any other means, for example to provide exchange land and provide for appropriate management and maintenance agreements."</p> <p>4.10.25 "Where the development has a sterilising effect on land use, there may be scope for this to be mitigated through, for example, using the land for nature conservation or wildlife corridors"</p> <p>4.10.26 "...The applicant is expected to take appropriate mitigation measures to address adverse effects on National Trails, other public rights of way and open access land and, where appropriate, to consider what opportunities there may be to improve access. In considering revisions to an existing right of way, consideration needs to be given to the use, character, attractiveness and convenience of the right of way. The Secretary of State should consider whether the mitigation measures put forward by an applicant are acceptable and whether requirements or other provisions in respect of these measures might be attached to any grant of development consent"</p> <p><b>Geology</b></p> <p>The draft NPS does not put forward any decision making criteria in relation to impacts on geology in this section.</p> <p><b>Soils</b></p> <p>This section of the draft NPS does not put forward any mitigation measures in relation to soils. Mitigation measures are, however, identified in the table of potential impacts in the 'Introduction' section.</p> <p>Overall, it is considered that the draft NPS makes a positive contribution to this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>To inform the appraisal of this section of the draft NPS, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on land use, geology and soils has</p>

## Land Use, Geology and Soils

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>been undertaken. This review is intended to help identify where any additional measures could be included in the draft NPS (in the introduction or mitigation section of the topic) to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p> <p>The following text identifies the anticipated impacts and associated mitigation measures. These have been largely identified within the draft NPS and are discussed again here to ensure that the description of impacts is clear and provides the necessary context for the recommended mitigation measures. Where impacts discussed here have not been included within the draft NPS, they have been clearly identified.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p> <p><i>Construction</i></p> <p>As noted in the draft NPS, works associated with the development of reservoirs could result in the loss of existing land uses (for example, agriculture) or indirectly affect nearby land uses (due to, for example noise disturbance). Construction activity may also lead to soil contamination as a result of accidental spillage, disturb existing contaminated land, and cause soil compaction as a result of the use of heavy machinery.</p> <p>In addition to the effects identified in the draft NPS, as reservoirs will be generally sited on greenfield land, the substantial land take that may be required could affect soils (including agricultural land). Further, depending on the location of development, there is the potential for works to affect geologically sensitive sites.</p> <p><i>Operation</i></p> <p>Once operational (and discounting any loss of land during construction), operational impacts associated with reservoir development are expected to be negligible. However, as noted in the draft NPS, there may be indirect impacts on soils associated with any changes in the local water regime.</p> <p><b>Water Transfer Schemes</b></p> <p><i>Construction</i></p> <p>As noted in the draft NPS, the construction of water transfer schemes and associated development can affect land use and soil. Impacts may be direct (for example, the loss of, or damage to, land and soil from new development) or indirect (for example, the location of new infrastructure affecting adjacent land uses). Works will be large in scale, with potentially very long-distance routing. As such, there is the potential for disturbance to or loss of agricultural land and other land uses and soil along the length of the route; however, land lost due to pipeline works can be reinstated following construction. Construction</p>



## Land Use, Geology and Soils

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>activity may also lead to soil contamination as a result of accidental spillage, disturb existing contaminated land, and cause soil compaction as a result of the use of heavy machinery.</p> <p>In addition to the effects identified in the draft NPS, depending on the location of development, there is the potential for works to affect geologically sensitive sites.</p> <p><i>Operation</i></p> <p>As noted in the draft NPS, once operational (and discounting any loss of land during construction), operational impacts associated with water transfer schemes are expected to be negligible. However, it should be noted that water transfer schemes can help to avoid the over abstraction of water and its associated effects, including the drying out of wetland areas and salt water intrusion into aquifers.</p> <p><b>Desalination</b></p> <p><i>Construction</i></p> <p>As noted in the draft NPS, the construction of desalination plants can affect land use and soil. Impacts may be direct (for example, the loss of, or damage to, land and soil from new development) or indirect (for example, the location of new infrastructure affecting adjacent land uses). Construction activity may also lead to soil contamination as a result of accidental spillage, disturb existing contaminated land, and cause soil compaction as a result of the use of heavy machinery.</p> <p><i>Operation</i></p> <p>Once operational (and discounting any loss of land during construction), operational impacts associated with desalination plants are expected to be negligible, although there may be some adverse impacts on adjacent land uses due to, for example, vehicle movements.</p> <p><b>No mitigation measures beyond those already identified in the draft NPS have been identified.</b></p>
			<p><b>No NPS:</b> Under this alternative, effects in respect of land use, geological and soils would be considered in accordance with national planning policy and the EIA Regulations. In addition, proposals would continue to be identified through the WRMP process which would include the consideration of effects on this topic. However, the opportunity for the draft NPS to provide clarity and further guidance would be lost in the absence of the draft NPS.</p>

## Land Use, Geology and Soils

Draft NPS Section	Draft NPS	No NPS	Appraisal
			Overall, even without the NPS, this alternative would still be considered to have a positive effect in relation to this AoS objective, although a degree of uncertainty persists.
<b>Other Sections of the Draft NPS Relevant to Land Use, Geology and Soils</b>	<p>The following provides additional commentary on the text in the other sections of the draft NPS relevant to land use, geology and soils. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b><u>1 Introduction</u></b></p> <p><b>1.1. Background and scope of this NPS</b> - at para 1.1.5 the consideration of land use, geology and soils is reflected in the need to apply the draft NPS in the context of section 104 of the Planning Act. This should help ensure that related effects, (both positive and negative), in so far as they are relevant to planning, are balanced. The net result of this balancing exercise could be uncertain, however.</p> <p>With regards to para 1.1.8, there is an opportunity for the consideration of effects on land use, geology and soils in a specific locality through the preparation of a local impact report submitted by a local authority in accordance with the Planning Act. There is no prescribed format for local impact reports but there is clearly an opportunity for a local authority to comment on this topic as an issue, helping to ensure that consideration is given to likely effects in a particular locality.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on land use, geology and soils in Scotland and Wales.</p> <p><b>1.3. Infrastructure covered by the Water Resources NPS</b> – as part of the options identification and appraisal process (including Strategic Environmental Assessment (SEA)) undertaken in support of WRMPs, early consideration will be given to the impacts of options on land use, geology and soils.</p> <p><b><u>2. Government Policy and the need for water resources infrastructure</u></b></p> <p><b>2.2. Pressure on water availability now and in the future</b> – this section makes specific reference to protecting and enhancing the environment as a key driver of the need for nationally significant water resources infrastructure.</p> <p><b>2.5. The role of water resource management plans in identifying the need</b> – as noted, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on land use, geology and soils. This is reflected paragraph 2.5.7.</p> <p><b>2.6 The role of nationally significant infrastructure projects</b> – this section identifies that alongside reservoirs, water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP, when assessed against the relevant threshold in the Planning Act 2008 or through a section 35 referral. These infrastructure types may have impacts on land use, geology and soils of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p>		

## Land Use, Geology and Soils

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p><b><u>3. Assessment Principles</u></b></p> <p><b>3.1 General principles of assessment</b> - the provisions of the Planning Act 2008 and the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, provides the starting point for the protection and enhancement of land use, geology and soils.</p> <p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on land use, geology and soils.</p> <p><b>3.2 Environmental Impact Assessment</b> – the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that this topic is fully considered, as will the consideration of cumulative effects and interrelationships between effects. This section specifically highlights that information gathered from the WRMP options assessments and the draft NPS will also be useful to identify the significant effects of a proposed project.</p> <p><b>3.4. Environmental Net Gain</b>- consideration of opportunities for environmental net gain during the WRMP options appraisal process and in the detailed design of schemes will ensure protection and (where possible) enhancement of geology and soils, in accordance with the NPPF and 25 Year Environment Plan. It is noted that this section advises that water companies consider using natural capital accounting and ecosystem services assessments to inform planning and underpin environmental improvements and that <i>"Applications for development consent must be accompanied by a statement demonstrating how opportunities for environmental net gain have been incorporated into the detailed design (including any relevant operational aspects) of the project"</i>.</p> <p><b>3.5 Assessing Alternatives</b> – the requirement that reasonable alternatives will need to be considered by the developer as part of scheme design and project planning including as part of the WRMP options appraisal process should ensure that land use, geology and soils are taken into account, both in terms of protection and opportunities for mitigation and enhancement.</p> <p><b>3.6 Criteria for 'good design for water resources infrastructure</b> – attention to good design principles and implementation will be of benefit to land use, geology and soils through the consideration of how a proposed scheme interacts with its context. Good design could include the sustainable use of soils and other materials.</p> <p><b>3.7 Climate Change adaptation</b> – ensuring that any development is appropriately adapted to future climate change will help avoid impacts on this land use and soils associated with climate change impacts on operations.</p> <p><b>3.8 Environmental Regulation</b> – the protection provided by other legislative provisions highlighted in the draft NPS will be important in helping to avoid effects on adjoining land uses and soils associated with development proposals.</p>

## Land Use, Geology and Soils

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>3.9. Common Law Nuisance and Statutory Nuisance</b> – paragraph 3.9.2 states that “During the examination of an application for development consent for infrastructure covered under this NPS, possible sources of nuisance under section 79(1) of the Environmental Protection Act 1990 should be considered by the Examining Authority. The Examining Authority should also consider how those sources of nuisance might be mitigated or limited so they can recommend appropriate requirements that the Secretary of State might include in any subsequent order granting development consent.” Provisions in relation to statutory nuisance will help ensure that significant effects in relation to any adjoining land uses are avoided.</p> <p><b>3.10. Safety</b> – The draft NPS highlights the role of safety regimes. This primarily relates to the health topic considered elsewhere in this AoS but there are also broader benefits relating to the consideration of other land uses that might be affected by water resources infrastructure.</p> <p><b>3.12. Health</b> – This section highlights the need for the ES to consider effects on human health and include measures to avoid, reduce or compensate such impacts as appropriate. The effects include access to land uses, including open space and water for recreation and physical activity.</p>
Summary Appraisal of Likely Significant Effects	+	+/?	<p><b>Draft NPS:</b> The development of nationally significant water resources infrastructure could affect land use, geology and soils. Impacts are likely to be principally associated with the land take required during construction but may also include contamination.</p> <p>In this context, the draft NPS highlights a broad range of issues that will need to be considered by both applicants and the Secretary of State in respect of land use, geology and soils and there are also potential synergies between this topic and others contained in the draft NPS including population, economics and skills and biodiversity and nature conservation. The draft NPS additionally identifies a range of mitigation measures that could be applied at the project stage to help mitigate adverse, and enhance positive, effects associated with the development of water resources infrastructure. The wider considerations of the draft NPS reflected in the assessment principles such as environmental net gain, EIA, SEA, WRMP development, good design and pollution control is also likely to result in positive effects.</p> <p>Overall, the draft NPS has been assessed as having a positive effect on this AoS objective.</p> <p><b>No NPS:</b> Under this alternative, applications would be subject to the provision of nationally planning policy and EIA Regulations which would require consideration of the effects on land use, geology and soils. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on land use, soils and geology. In consequence, even without the NPS, it would therefore still be considered to have a positive effect in relation to this AoS objective. However the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level</p>

## Land Use, Geology and Soils

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Summary of Recommended Mitigation and Enhancement</b>	<p>The draft NPS makes a positive contribution to the land use, geology and soils AoS objective and no additional project-level mitigation beyond that already set out in the draft NPS has been identified. However, section 4.10 of the draft NPS could be enhanced through, in particular:</p> <ul style="list-style-type: none"><li>• greater consideration of the marine environment and geology;</li><li>• strengthening of linkages to the NPPF, PPG and Environmental Protection Act 1990 as well as other guidance;</li><li>• provision of further guidance for applicants in respect of the enhancement of open space and green infrastructure;</li><li>• inclusion of a requirement for a Soil Management Plan;</li><li>• provision of further guidance on the possible contents of an ES.</li></ul>		

## Water Quality

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# 5. Water Quality

## 5.1 Introduction

This section presents the overview of the plans, programmes and baseline information for the appraisal of sustainability of the National Policy Statement for Water Resources in respect of water quality.

Water quality within this context is defined as inland surface freshwater, groundwater, estuarine, coastal and marine water quality.

There are links between water quality/resources and a number of other Appraisal of Sustainability (AoS) topics, in particular the effects and interactions of water quality on biodiversity and human health and flood risk.

**It should be noted that for the purposes of this Report, water quality and water quantity have been discussed as two separate topics. The two topics are very closely related and in the majority of cases, both the plans and programmes and the baseline data discussed under one topic could also be discussed under the other. Therefore, to avoid unnecessary duplication, in the majority of instances a given issue is only discussed under the topic to which it is most directly relevant.**

## 5.2 Review of Plans and Programmes

The *Water Framework Directive (WFD) (2000/60/EC)* provides the basis for the protection of water resources, with further EU directives providing legislation to ensure water quality. The water resources plans and policies also seek to ensure that a suitable volume of potable water is available in light of the increasing demand for water. Together, the EU directives and domestic legislation aim ensure that water quality is maintained throughout the water cycle, including appropriate treatment of wastewater, safe standards for drinking water and the maintenance of inland and coastal water quality.

Plans such as the *Great Britain Invasive Non-native Species Strategy (2015)* recognise the two-way relationship between water quality and invasive non-native species. Invasive species can have significant effects on water quality and aquatic ecosystem health and in turn aquatic ecosystems with poor water quality can provide an opportunity for the proliferation of non-native species.

### International/European

The ***Water Framework Directive (WFD) (2000/60/EC)*** is the most substantial piece of EC water legislation to date and replaced a number of existing Directives including the Surface Water Abstraction Directive. It establishes a framework for the protection of inland surface waters, transitional waters, coastal water and groundwater and is designed to improve and integrate the way water bodies are managed, including encouraging the sustainable use of water resources. The key objectives at the European level are general protection of the aquatic ecology, specific protection of unique and valuable habitats, protection of drinking water resources and protection of bathing water.

Article 4(1) of the WFD sets out that the objectives for surface water, groundwater, transitional and coastal water bodies are to:

- prevent deterioration;
- reduce pollution;

## Water Quality

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- protect, enhance and restore condition;
- achieve 'good status' by 2015, or an alternative objective where allowed; and
- comply with requirements for protected areas.

Article 7.3 of the Directive notes that Member States shall ensure the necessary protection for the bodies of water identified (for the purposes of providing human consumption for 50 persons or more, or providing more than 10m<sup>3</sup> a day as an average and those bodies of water intended for such future use) with the aim of avoiding deterioration in their quality in order to reduce the level of purification treatment required in the production of drinking water. In addition, Member States may establish safeguard zones for those bodies of water.

The WFD adopted the 'polluter pays principle' in seeking to ensure that the costs and benefits of discharging pollutants to the water environment are appropriately valued, and that implementation of the Directive is achieved in a fair and proportionate way across all sectors.

The **Groundwater Directive (2006/118/EC)** established a regime which sets groundwater quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater. The Directive established quality criteria that takes account local characteristics and allows for further improvements to be made based on monitoring data and new scientific knowledge. It is intended to complement the requirements of the WFD.

The **Drinking Water Directive (DWD) (98/83/EC)** concerns the quality of water intended for human consumption. The objective of the DWD is to protect the health of the consumers in the EU and to make sure the water is wholesome and clean. To do this, the DWD sets standards for 48 (microbiological and chemical) parameters that can be found in drinking water. The parameters must be monitored and tested regularly. Member States have to monitor the quality of the drinking water supplied to their citizens and of the water used in the food production industry. Member States report at three yearly intervals the monitoring results to the European Commission.

The **Urban Waste Water Treatment Directive (91/271/EEC)** has the objective of protecting the environment from the adverse effects of untreated 'urban waste water' ('sewage'). The Directive established minimum requirements for the treatment of significant sewage discharges. An important aspect of the Directive is the protection of the water environment from nutrients (specifically compounds of nitrogen and phosphorus) and/or nitrates present in waste water where these substances have adverse impacts on the ecology of the water environment or abstraction source waters. It was transposed into English law through the **Urban Waste Water Treatment (England and Wales) Regulations 1994 (as amended) (SI 1994/2841)**.

The **Urban Waste Water Directive (98/15/EC)** amended the **Urban Waste Water Treatment Directive 91/271/EEC** to clarify the requirements of the Directive in relation to discharges from urban waste water treatment plants to sensitive areas which are subject to eutrophication.

With specific regard to coastal water quality, the **Bathing Waters Directive (2006/7/EC)** sets standards for the quality of bathing waters in terms of:

- the physical, chemical and microbiological parameters;
- the mandatory limit values and indicative values for such parameters; and
- the minimum sampling frequency and method of analysis or inspection of such water.

## Water Quality

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The **Marine Strategy Framework Directive (2008/56/EC)** requires Member States to take the necessary measures to achieve or maintain good environmental status in the marine environment by 2020 at the latest through the development and implementation of marine strategies.

The OSPAR is the mechanism by which fifteen Governments of the western coasts and catchments of Europe, together with the European Community, cooperate to protect the marine environment of the North-East Atlantic. A key publication is **The North-East Atlantic Environment Strategy of the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic 2010–2020** which sets out the OSPAR Commission's vision is a clean, healthy and biologically diverse North-East Atlantic ocean, used sustainably.

In addition, the following European Directives have relevance to the protection of the water environment and resources:

- Directive on Priority Substances 2008/105/EC;
- Waste Framework Directive 2008/98/EC;
- Industrial Emissions Directive 2010/75/EU; and

## UK

The **Flood and Water Management Act 2010** makes provisions for water, including water resources, including:

- to widen the list of uses of water that water companies can control during periods of water shortage, and enable Government to add to and remove uses from the list;
- to encourage the uptake of sustainable drainage systems (SUDS) by removing the automatic right to connect to sewers and providing for unitary and county councils to adopt SUDS for new developments and redevelopments;
- to reduce 'bad debt' in the water industry by amending the Water Industry Act 1991 to provide a named customer and clarify who is responsible for paying the water bill; and
- to make it easier for water and sewerage companies to develop and implement social tariffs where companies consider there is a good cause to do so, and in light of guidance that will be issued by the Secretary of State following a full public consultation.

**Shoreline Management Plans (SMPs)** set policies for the whole coast of England and Wales over 20, 50, and 100 year timeframes (2005-2025, 2025-2055, and 2055-2105). They include an action plan of what is required to manage coastal processes and where. The actions plans form the basis of decision making for such works.

The Marine Strategy Framework Directive has been transposed into UK law through the **Marine Strategy Regulations 2010** (SI 2010/1627). It aims to achieve good environmental status of the EU's marine waters by 2021 and to protect the resource base upon which marine-related economic and social activities depend.

The **Marine and Coastal Access Act 2009** sets out a number of measures including the establishment of Marine Conservation Zones (MCZs) and Marine Spatial Plans. The main objectives of the **Marine Policy Statement (2011)** are to enable an appropriate and consistent approach to marine planning across UK waters, and to ensure the sustainable use of marine resources and strategic management of marine activities from renewable energy to nature conservation, fishing, recreation and tourism.

The **Water Quality and Supply (Fees) Order 2016** sets out the fees that the Chief Inspector of Drinking Water may charge relevant water suppliers for the exercise of functions performed by an inspector. These



## Water Quality

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functions include checking water sampling and analysis and water supply management arrangements and investigating events, incidents, emergencies or other matters arising from the quality or quantity of water.

The **Great Britain Invasive Non-native Species Strategy (2015)** sets aims and objectives to 2020 to address the increasing numbers of invasive species introduced in Great Britain, with around 80 non-native species established in Great Britain's freshwater environment.

The **Environmental Permitting (England and Wales) Regulations 2016** (SI 2016/1154) consolidates a range of previous permits required for processes which might cause pollution and could affect water quality. It covers water discharges, groundwater activities, radioactive substances, waste, mining and installations. It requires operators to obtain permits for some facilities, to register others as exempt and provides for ongoing supervision by regulators. The aim of the regime is to:

- protect the environment so that statutory and Government policy, environmental targets and outcomes are achieved;
- deliver permitting and compliance with permits and certain environmental targets effectively and efficiently in a way that provides increased clarity and minimises the administrative burden on both the regulator and the operators;
- encourage regulators to promote best practice in the operation of facilities; and
- continue to fully implement European legislation.

## England and Wales

In England, the implementation work related to the WFD is undertaken by the Environment Agency, working with key partners. Natural Resources Wales undertakes the same duties for WFD implementation in Wales. There are 11 River Basin Districts in England and Wales which each require (under the WFD) a **River Basin Management Plan (RBMP)** including objectives for surface water, groundwater, transitional and coastal water bodies. The Western Wales River Basin District, is contained and managed wholly in Wales. The two other River Basin Districts in Wales are cross-border with England: the Severn River Basin District and the Dee River Basin District. The Environment Agency leads on the development of the Severn River Basin Management Plan, whilst Natural Resources Wales leads on the development of the Dee River Basin Management Plan. For this reason, the majority of data and programmes regarding water quality and resources cover both administrations and therefore England and Wales are considered collectively in this context.

Updated RBMPs were published in February 2016 for 8 river basin districts.

The 2011 White Paper, *Water for Life*, sets out the Government's vision for future water management in which the water sector is resilient and water is valued as a precious resource. The key reforms set out in the White Paper are:

- the introduction of a reformed water abstraction regime, as signalled in the Natural Environment White Paper changes, to deal with the legacy of over-abstraction of our rivers;
- a new catchment approach to dealing with water quality and wider environmental issues;
- with the Environment Agency and Ofwat, provide clearer guidance to water companies on planning for the long term, and keeping demand down;
- consultation on the introduction of national standards and a new planning approval system for sustainable drainage; and

## Water Quality

- collaboration with water companies, regulators and customers to raise awareness of the connection between how we use water and the quality of our rivers.

### ***Water for people and the environment - Water resources strategy for England and Wales (2009)***

published by Environment Agency, includes the following objectives:

- enable habitats and species to adapt better to climate change;
- allow protection for the water environment to adjust flexibly to a changing climate;
- reduce pressure on the environment caused by water taken for human use;
- encourage options resilient to climate change to be chosen in the face of uncertainty;
- better protect vital water supply infrastructure;
- reduce greenhouse gas emissions from people using water, considering the whole life-cycle of use; and
- improve understanding of the risks and uncertainties of climate change.

Other relevant strategies include the Environment Agency's ***Catchment Abstraction Management Strategies*** (CAMS) which have identified a number of catchments in England and Wales that are designated as 'over-licensed' or 'over-abstracted'. That is, where the current level of licensed abstraction could result in an unacceptable stress on the catchment's ecology (designated over-licensed) or possibly is resulting in an unacceptable effect (designated over-abstracted).

The ***Water Supply (Water Quality) Regulations 2016*** consolidate legislation concerning the quality of water supplies for human consumption in England. The regulations also apply to supplies in Wales where the water undertaker or licensee is primarily based in England.

## England

The ***Groundwater (Water Framework Directive) (England) Direction 2016*** sets out instructions to the Environment Agency on obligations to protect groundwater (water found below the surface). It updates requirements including:

- the monitoring and setting of thresholds for pollutants in groundwater;
- adding new pollutants to the list of pollutants to be monitored; and
- changing the information to be reported to the European Commission.

The Groundwater (Water Framework Directive) (England) Direction 2016 revoked and replaced the Groundwater (Water Framework Directive) (England) Direction 2014, which applied to England. Similar Directions have been issued by the Welsh Ministers to Natural Resources Wales.

The ***Nitrate Pollution Prevention Regulations 2015*** provides for, among other issues, the designation of land as nitrate vulnerable zones.

The Marine Management Organisation (MMO) is responsible for preparing marine plans in England. The East Inshore and East Offshore marine plan areas were the first two to be selected in England. The East Inshore Marine Plan area covers 6,000 square kilometres of sea. It stretches from mean high water springs to 12 nautical miles offshore off the coastline between Flamborough Head and Felixstowe. The East Offshore Marine Plan area extends from the outer boundary of the East Inshore area to England's borders with the Netherlands, Belgium and France. This is a total of about 49,000 square kilometres of sea. The South Inshore and South Offshore areas are the third and fourth areas in England to be selected for marine planning.

## Water Quality

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The **National Policy Statement for Waste Water (2012)** sets out Government policy for the provision of major waste water infrastructure in England. It will be used by the decision maker as the primary basis for deciding development consent applications for waste water developments that fall within the definition of Nationally Significant Infrastructure Projects (NSIP) set out in the Planning Act 2008.

The **National Planning Policy Framework (MHCLG, 2018)** expects the planning system to contribute to conserving and enhancing the natural environment and reducing pollution. In particular, the planning system is expected to prevent new development from contributing to unacceptable levels of water pollution.

Local planning authorities are expected to set out the strategic priorities for their area in the Local Plan including strategic policies to deliver the provision of infrastructure for water supply and wastewater. In preparing the evidence base for their Local Plans, they are expected to work with other authorities and providers to assess the quality and capacity of the existing infrastructure and its ability to meet forecast demands. Public bodies have a duty to co-operate on planning issues that cross administrative boundaries particularly those which relate to strategic priorities.

**Planning Practice Guidance** relating to water supply, wastewater and water quality provides advice on how planning can ensure water quality and the delivery of adequate water and wastewater infrastructure, which is needed to support sustainable development. It promotes a catchment based approach as set out by Defra in **Catchment Based Approach: Improving the Quality of our Water Environment** (2013), which provided the initial framework to bridge the gap between local actions and River Basin Management Plans. It identifies the following key issues for plan-making to consider with regards to infrastructure:

- Identifying suitable sites for new or enhanced infrastructure. In identifying sites it will be important to recognise that water and wastewater infrastructure sometimes has particular locational needs (and often consists of engineering works rather than new buildings) which mean otherwise protected areas may exceptionally have to be considered where consistent with their designation. Plan-making will also need to take into account existing and proposed development in the vicinity of a location under consideration for water and wastewater infrastructure. In 2-tier areas there will need to be close working between the district and county councils.
- Considering whether new development is appropriate near to sites used (or proposed) for water and wastewater infrastructure (for example, odour may be a concern).
- Phasing new development so that water and wastewater infrastructure will be in place when needed.

It also identifies the following issues with regards to water quality:

- How to help protect and enhance local surface water and groundwater in ways that allow new development to proceed and avoids costly assessment at the planning application stage. For example, can the plan steer potentially polluting development away from the most sensitive areas, particularly those in the vicinity of potable water supplies (designated source protection zones or near surface water drinking water abstractions)?
- The type or location of new development where an assessment of the potential impacts on water bodies may be required.
- Where particular types of sustainable drainage systems may not be practicable.

The National Environment Programme published by the Environment Agency outlines improvements required to meet European Directives. It includes actions to improve the quality of water that is discharged

## Water Quality

from sewage treatment to either rivers or the sea, prevent chemicals from entering groundwater and ensure that abstraction of water does not adversely impact on habitats which are protected by law.

**The Water Industry Strategic Environmental Requirements (2017)** issued by the Environment Agency and Natural England jointly is intended to give a clear steer to water companies on expectations for their approach on resilience and their obligations in terms of enhancing and valuing the environment. Water company performance commitments should take account of local environmental and flood risk pressures and opportunities, customer priorities and the regulatory expectations and best practice set out within the requirements.

**A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)** includes policies and actions designed to reform the approach to water abstraction and improve water quality. The Plan contains a target to ensure that at least three quarters of waters are as close to their natural state as soon as is practicable. This includes (inter alia) measures to: reduce abstraction of water from rivers and groundwater where detrimental; reaching or exceeding objectives for rivers, lakes, coastal and ground waters that are specially protected for biodiversity or drinking water; and minimising bacteria (Intestinal Enterococci and E.Coli) in designated bathing waters.

## Scotland

The **Water Environment and Water Services (Scotland) Act 2003 (as amended)** makes provisions for the protection of the Scottish water environment, including a timetable for implementation of requirements of the WFD up until 2015.

The **Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)** (SSI 2011/209) sets out the process by which activities that have the potential to affect Scotland's water environment are regulated. Authorisation under the Controlled Activities Regulations (CAR) is required for discharging to waters, disposal of pollutants to land, abstractions, impoundments and engineering works affecting water bodies.

Scotland's **National Marine Plan (NMP) (2015)** is a single framework, enabling the sustainable development of Scotland's marine area in a way which will protect and enhance the marine environment whilst ensuring the sustainable growth of both existing and emerging marine industries.

The **River Basin Management Plans for the Solway Tweed River Basin District and Scotland River Basin District (2015)** seek to ensure that the water environment is protected, and where necessary and possible improved to good ecological condition in a pragmatic, and sensible way which balances human benefit with ecological impact.

Other relevant strategies include the Scottish Government's **Bathing Water Strategy for Scotland (2006)** which sets out a framework for meeting the challenges associated with implementing the revised Bathing Water Directive. This revision requires stricter bacteriological standards to be met in the future and sets new requirements for the provision of information on water quality to the public, as well as for engaging public participation in matters relating to bathing waters.

The Scottish Government's **A Strategy for Scotland's Coast and Inshore Waters (2004)** has goals that include (inter alia): delivering integrated management for the whole Scottish coast; establishing an integrated system of spatial planning for Scotland's inshore marine area which combines with the terrestrial planning system; strategic and adequately resourced leadership for the management and sustainable use of coastal resources; safeguard the resources of Scotland's coast and inshore waters and to promote awareness; and to achieve effective stakeholder participation at the appropriate geographical and administrative levels.

## Water Quality

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Policies aimed to provide a sustainable future for Scotland's groundwater resources by protecting legitimate uses of groundwater are included within the **Groundwater Protection Policy for Scotland (2009)**.

**Scottish Planning Policy (2014)** places a duty on the planning system to protect and improve the water environment, including rivers, lochs, estuaries, wetlands, coastal waters and groundwater, in a sustainable and co-ordinated way. **Scotland's Third National Planning Framework (2014)** sets out the importance of managing the water environment in a sustainable manner and the relevance of water within planning and the decision making process.

The Scottish Government provides advice in the form of Planning Advice Notes (PAN) on water and drainage including PAN 61: Planning and sustainable urban drainage systems and PAN 79: Water and drainage.

## Wales

The **Water Strategy for Wales (2015)** sets out the strategic direction for water policy in Wales over the next 20 years and beyond. Water is one of the greatest natural assets and an integral part of Wales' culture, heritage and national identity. The Strategy highlights the Welsh Government's vision to ensure that Wales continues to have a thriving water environment which is sustainably managed to support healthy communities, flourishing businesses and the environment. The strategy will contribute to wider Welsh Government priorities and principles, including tackling poverty.

The Welsh National Marine Plan (WNMP), which covers Welsh inshore and offshore waters, is currently being developed. The Welsh Government is responsible for marine planning in Wales and marine planning will help to manage marine activities sustainably. The WNMP will have a 20 year outlook and provide important information and guidance to those who wish to use or undertake development in the marine area.

Within the **Environment Strategy for Wales (2006)** there are a number of water related objectives; including:

- to manage water resources sustainably without causing environmental damage;
- to increase water efficiency and maintain water quality;
- to maintain and enhance the quality of water sources; understand and manage diffuse pollution sources; and
- to minimise the risk posed by exposure to chemicals.

**Planning Policy Wales (Edition 9) (2016)** sets out the land use planning policies of the Welsh Government. Regarding water resources, Planning Policy Wales seeks to protect and improve water resources through increased efficiency and demand management of water, particularly in those areas where additional water resources may not be available, and ensure that appropriate sewerage facilities are provided to convey, treat and dispose of waste water in accordance with appropriate legislation and sustainability principles.

The **Nitrate Pollution Prevention (Wales) Regulations 2013** continue to implement Council Directive 91/676/EEC concerning the protection of waters against pollution by nitrates from agricultural sources.

The **Well-being of Future Generations (Wales) Act 2015** became law in Wales on 29th April 2015 and strengthens existing governance arrangements for improving the well-being of Wales to ensure that present needs are met without compromising the ability of future generations to meet their own needs. This act is supported by the **Planning (Wales) Act (2015)** and **Environment (Wales) Act 2016**.

The **Environment (Wales) Act 2016** recognises that natural resources, such as water, are amongst the most important assets. The Act includes features that will ensure that managing these natural resources sustainably will be a core consideration in decision-making including providing for targets for reducing emissions of

## Water Quality

greenhouse gases. It also established the Flood and Coastal Erosion Committee and made minor changes to the law about land drainage.

The **Groundwater (Water Framework Directive) (Wales) Directions 2016** gives direction to Natural Resources Wales on implementing the Water Framework Directive and the Groundwater Directive in Wales.

## 5.3 Overview of the Baseline

### UK

The UK has a diversity of inland and coastal waters (such as reservoirs, lakes, rivers, canals, estuaries, transitional waters and coastal waters). Protected water features include: waters designated for human consumption (including those abstracted from groundwater); areas designated for the protection of economically significant aquatic species (e.g. shellfish or freshwater fish); bathing waters (under the Bathing Waters Directive); nutrient-sensitive areas; and areas with waters important to protected habitats or species under the Habitats Directive or the Birds Directive.

There are 189 protected areas in UK inshore waters with a marine element, which includes 102 Special Protection Areas (SPAs) with marine habitats for birds<sup>181</sup>, 105 Special Areas of Conservation (SACs) with marine habitats or species<sup>182</sup> 56 Marine Conservation Zones, 30 Nature Conservation Marine Protected Areas<sup>183</sup> and three Marine Nature Reserves. In total, the area coverage of these sites exceeds 1.5 million hectares, or 1.8% of UK waters.

The principal aquifers of the UK are located in the lowlands of England. The most important are the Chalk, Permo-Triassic sandstones, the Jurassic limestones and the Lower Greensand<sup>184</sup>.

### England

#### Water Quality

There are 8 river basin management areas in England:

- Anglian river basin;
- Humber river basin;
- Northumbria river basin;
- North West river basin;
- Severn river basin;
- South East river basin;
- South West river basin;

<sup>181</sup> Joint Nature Conservation Committee (2017). *SPAs with marine components*. Available online at: <http://jncc.defra.gov.uk/page-4559>

<sup>182</sup> Joint Nature Conservation Committee (2017). *SACs with marine components*. Available online at: <http://jncc.defra.gov.uk/page-1445>

<sup>183</sup> Joint Nature Conservation Committee (2017) *Contributing to a marine protected area network*. Available online at: <http://jncc.defra.gov.uk/page-4549>

<sup>184</sup> Natural Environment Research Council. *The Aquifers of the UK*. Available online at: [http://www.groundwateruk.org/downloads/the\\_aquifers\\_of\\_the\\_uk.pdf](http://www.groundwateruk.org/downloads/the_aquifers_of_the_uk.pdf)

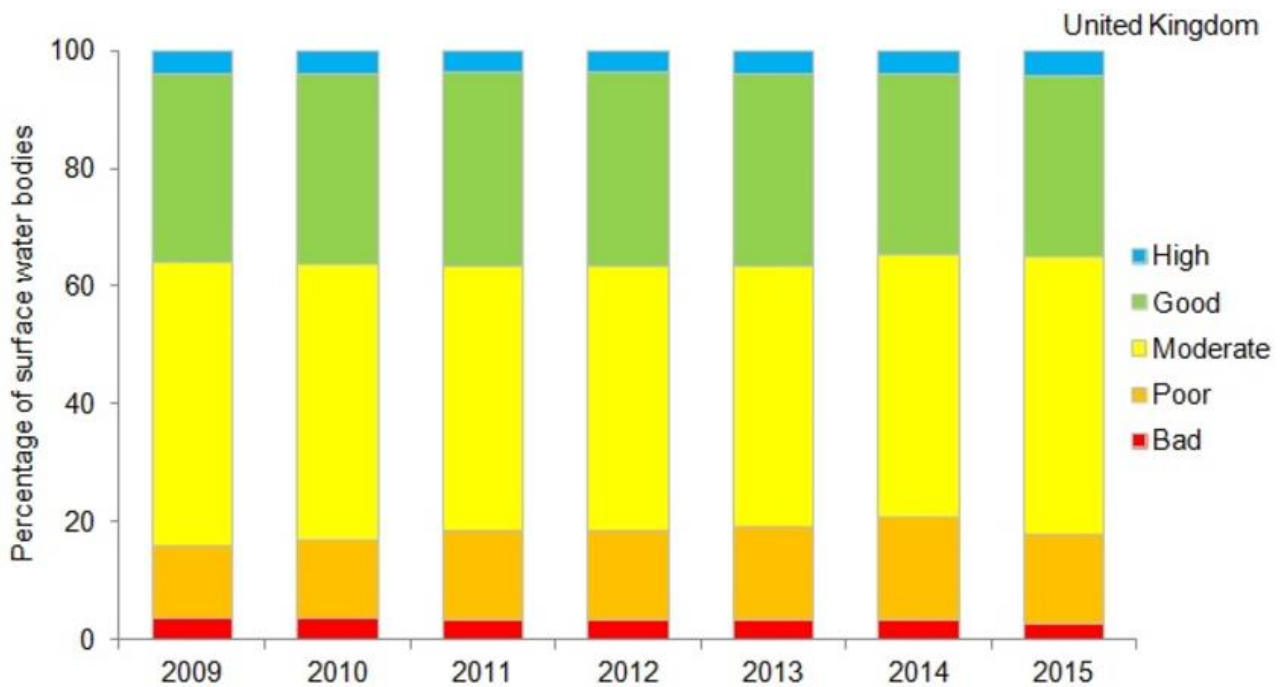
## Water Quality

- Thames river basin.

A river basin district covers an entire river system, including river, lake, groundwater, estuarine and coastal water bodies. The River Basin Management Plans are designed to protect and improve the quality of our water environment. Good quality water is essential for wildlife, agriculture and business to thrive

**Figure 5.1** shows the status classification of all UK surface water bodies under the Water Framework Directive.

Figure 5.1 Status classification of UK surface water bodies under the Water Framework Directive, 2009 to 2015



Source: Joint Nature Conservancy Council

River water quality in England has in general been steadily increasing since 1990. The proportion of rivers at good or high biological quality did not change significantly between 2009 and 2012 but decreased slightly in 2013 and 2014<sup>185</sup>.

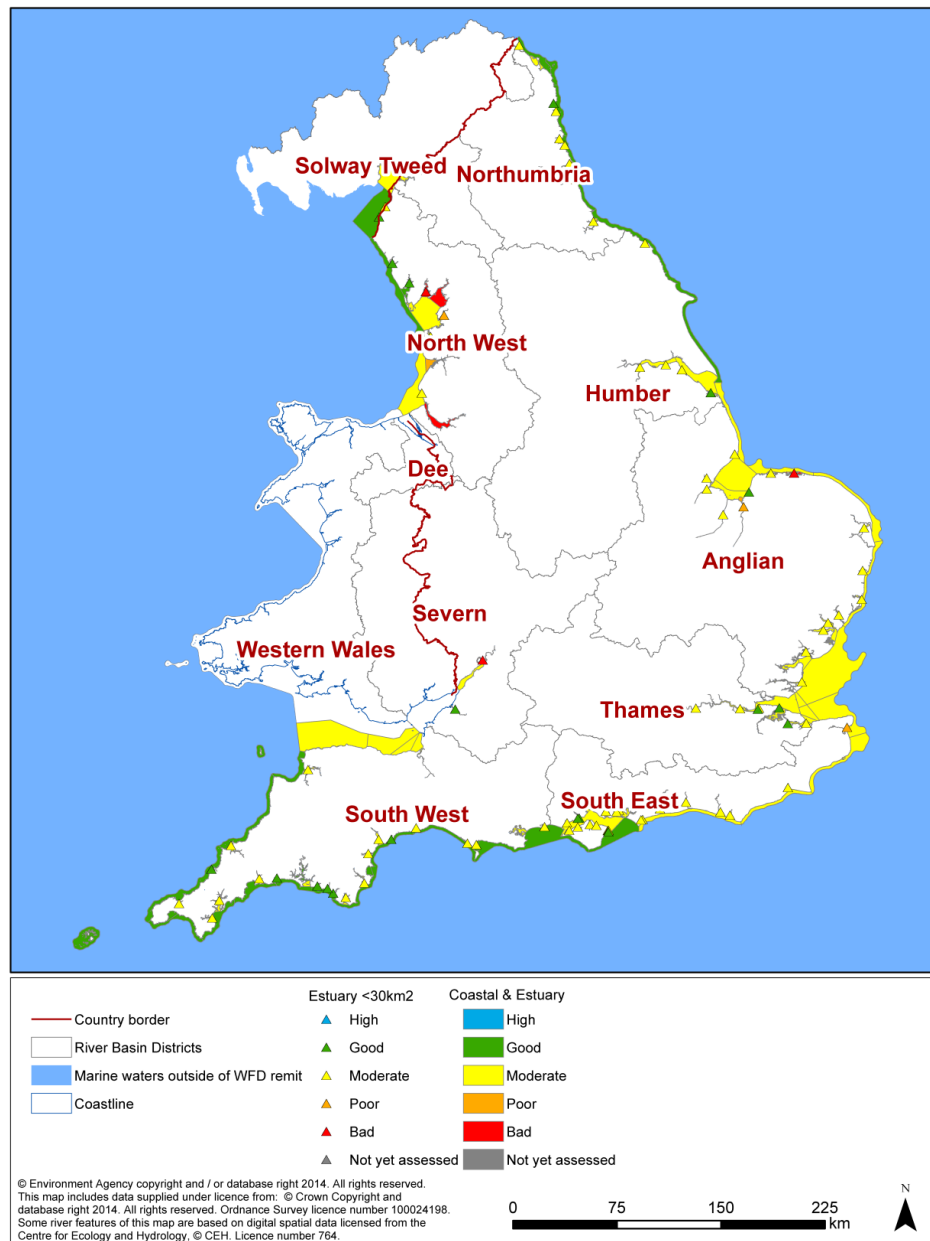
Coastal water quality has improved over the last two decades, however current WFD draft classification results and maps produced by the Environment Agency indicate that there are still a large proportion of coastal waters in England (and Wales) that are classified as being of Moderate Ecological Status (see **Figure 5.2**), i.e. are failing to meet 'Good Ecological Status' (GES) on the basis of a number of physio-chemical and biological standards and are therefore in need of measures to achieve GES.

<sup>185</sup> Office for National Statistics (2015) *Sustainable Development Indicators*. Available online at: <http://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/sustainabledevelopmentindicators/2015-07-13>



## Water Quality

Figure 5.2 Ecological Status or Potential for Estuaries and Coastal Water Bodies in England and Wales



**Source:** Estuarine and coastal waters national engagement summary. Environment Agency, 2014.

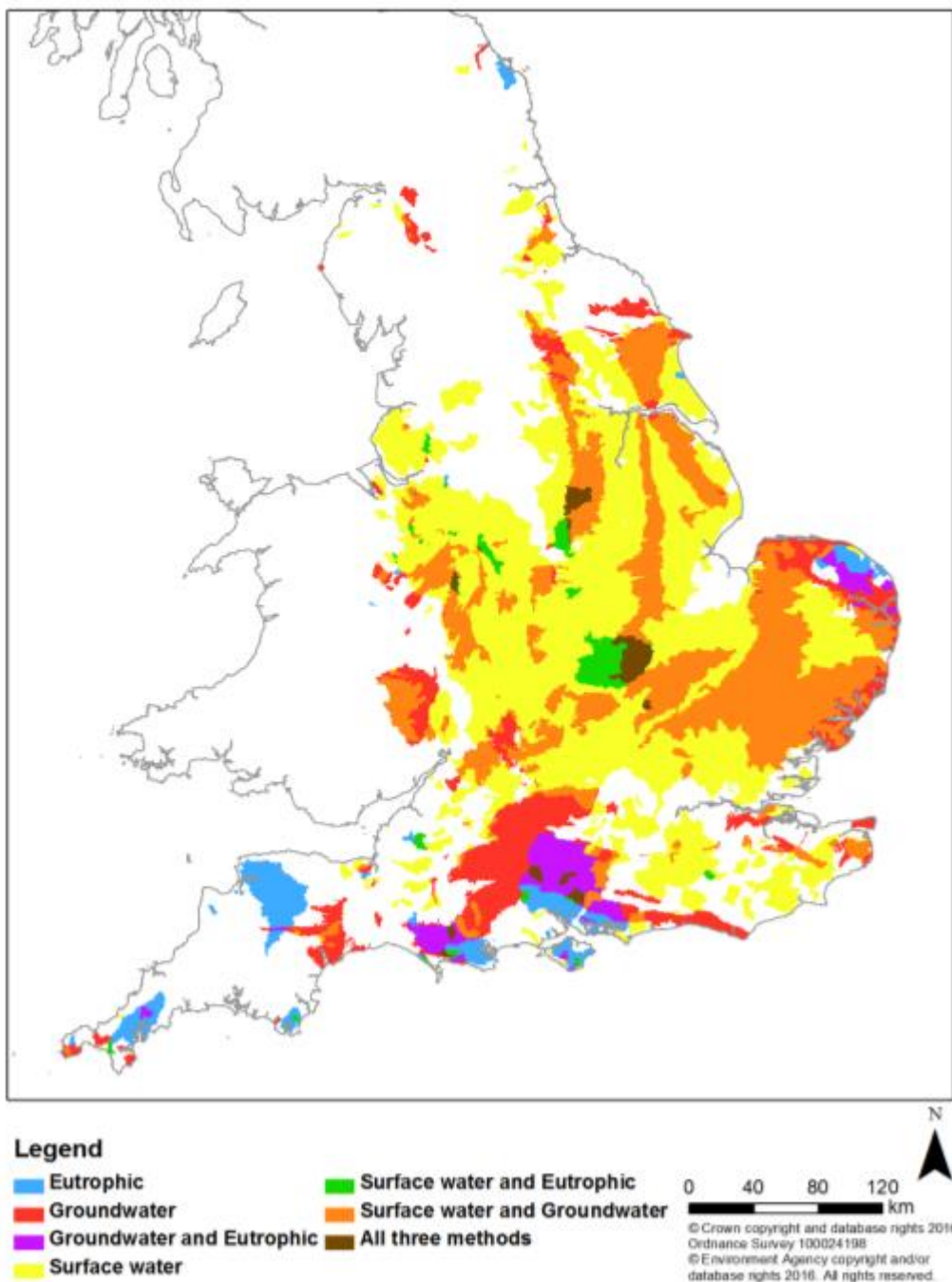
A Nitrate Vulnerable Zone (NVZ) is an area of land that drains into polluted waters and contributes to the pollution of those waters. Polluted waters are waters that are affected by nitrate pollution or could be if the Regulations are not applied in the area concerned. The Nitrate Pollution Prevention Regulations 2015 require the review of NVZs at least every 4 years. The latest review<sup>186</sup> identifies both existing areas at risk alongside new area and the methods that designate each area as shown in **Figure 5.3**.

<sup>186</sup> Environment Agency (2017) *Review of Nitrate Vulnerable Zone designations for implementation in 2017*. Available online at: [http://apps.environment-agency.gov.uk/static/documents/nvz/NVZ2017\\_Recommendation\\_Report\\_Final\\_HOEV151604\\_R\\_1611115.pdf](http://apps.environment-agency.gov.uk/static/documents/nvz/NVZ2017_Recommendation_Report_Final_HOEV151604_R_1611115.pdf)



## Water Quality

Figure 5.3 Proposed 2017 NVZs and the methods that designate each area



**Source:** Environment Agency

Groundwater provides a third of drinking water in England, and up to 80% in some areas of southern England. The Environment Agency has defined Source Protection Zones (SPZs) for 2,000 groundwater sources. These zones show the risk of contamination from any activities that might cause pollution in the area. The Environment Agency use the zones in conjunction with their Groundwater Protection Policy to set up pollution prevention measures in areas which are at a higher risk and to monitor the activities of potential polluters nearby.

## Water Quality

Groundwater Source Protection Zones are classified as either 'Inner Zone' (Zone 1), 'Outer Zone' (Zone 2), 'Total Catchment/Source Catchment' (Zone 3) or 'Special Interest' (Zone 4). The shape and size of a zone depends on the condition of the ground, how the groundwater is removed, and other environmental factors. A map that shows the contours of these zones for England and Wales can be viewed on the Environment Agency's website at:

<http://maps.environment-agency.gov.uk/wiyby/wiybyController?x=357683.0&y=355134.0&scale=1&layerGroups=default&ep=map&texonly=off&lang=e&topic=groundwater>.

## Bathing Water

In 2016, 98.5% of bathing waters met the minimum standard of the Bathing Water Directive, with 69.5% reaching the excellent standard. A total of 6 bathing waters, representing 1.5% of the total, did not meet the minimum requirement. Due to a change in recording methodology, bathing water quality statistics can only be compared to statistics from the year 2015 onwards, which at the time of writing provides only two years' worth of comparable datasets. Nonetheless, the data for 2016 showed an improvement on the data from 2015 as a result of recent improvements to infrastructure and more favourable weather conditions<sup>187</sup>.

## Scotland

### Water Quality

Overall, Scotland's water environment is in a good condition but a wide range of problems exist at local levels. In most cases, the risks to water quality are declining, the exception being groundwater.

Scotland has two river basin districts: the Scotland river basin district which covers most of Scotland and the Solway Tweed river basin district in the south of the country. The Scotland river basin district has been subdivided into eight Management Plan Areas which are administered by eight regional 'Area Advisory Groups' (AAGs). These are: Argyll; Clyde; Forth; North East Scotland; North Highland; Orkney and Shetland; Tay and West Highland.

**Table 5.1** displays the percentage of water bodies in each class in Scotland for 2014<sup>188</sup>.

**Table 5.1** WFD Classification Results for Water Bodies in Scotland: Percentage of Water Bodies in each Class 2014

Status	High	Good	Moderate	Poor	Bad
<b>Category</b>					
Rivers	6.9	47.1	24.1	14.6	5.3
Lochs	30.8	35.6	17.7	14.4	1.5
Estuaries	30.6	55.1	14.3	0.0	0.0
Coastal Waters	32.2	64.5	3.1	0.2	-

<sup>187</sup> Defra (2016) *Statistics on English coastal and inland bathing waters: a summary of compliance with the 2006 Bathing Water Directive*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/565710/STATS\\_bathing-water-release-2016v1.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/565710/STATS_bathing-water-release-2016v1.pdf)

<sup>188</sup> Scottish Environment Protection Agency. *Water Body Classification*. Available online at:

<http://www.environment.scotland.gov.uk/get-interactive/data/water-body-classification/> and <http://www.environment.scotland.gov.uk/get-interactive/data/groundwater/>

## Water Quality

Status	High	Good	Moderate	Poor	Bad
Category					
Groundwater	-	77.7	-	22.3	-

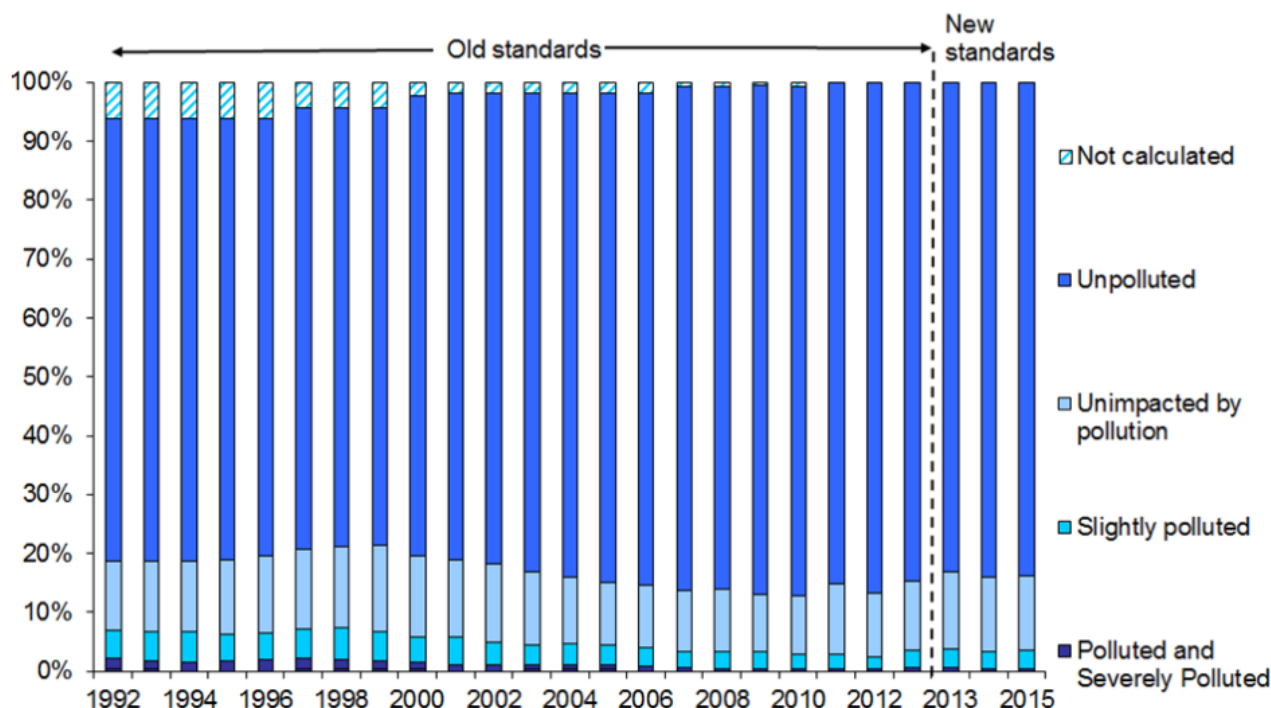
Sources: <http://www.environment.scotland.gov.uk/get-interactive/data/water-body-classification/> and <http://www.environment.scotland.gov.uk/get-interactive/data/groundwater/>.

The Scottish Environment Protection Agency (SEPA) has established an indicator of river water quality based on a network of sites covering 253 water bodies (rivers, or sections of rivers), which account for approximately 10% of all water bodies. The indicator is based on a consistent set of five water quality parameters which are sensitive to organic pollution, nutrients and toxic substances and provide a measure of species diversity. Each of the parameters is assessed over a rolling 3 year period and the results weighted by river length.

The assessment is against the standards provided for each parameter in the Water Framework Directive classification. Two of the Water Framework Directive standards, invertebrates and phosphorus, used to calculate the indicator were changed in 2013; SEPA is looking into back calculating the indicator values potentially as far back as 2007 using the new standards to provide a consistent time series

The proportion of river length that was classed as slightly polluted, polluted or severely polluted in Scotland rose from 6.8% in 1992, to 7.4% in 1998, before falling to 3.4% in 2013, using the old standards. Using the new standards, this proportion fell from 3.7% in 2013 to 3.5% in 2015. The proportion of river length classed as unpolluted fell from 86.5% in 2010 to 84.8% in 2013. Using the new standards, the proportion of river length classed as unpolluted rose from 83.3% in 2013 to 84.0% in 2015. In 2015, the proportion of river length classed as unimpacted by pollution was 12.5%. **Figure 5.4** shows the historic data for river quality.

Figure 5.4 River water quality 1992-2015



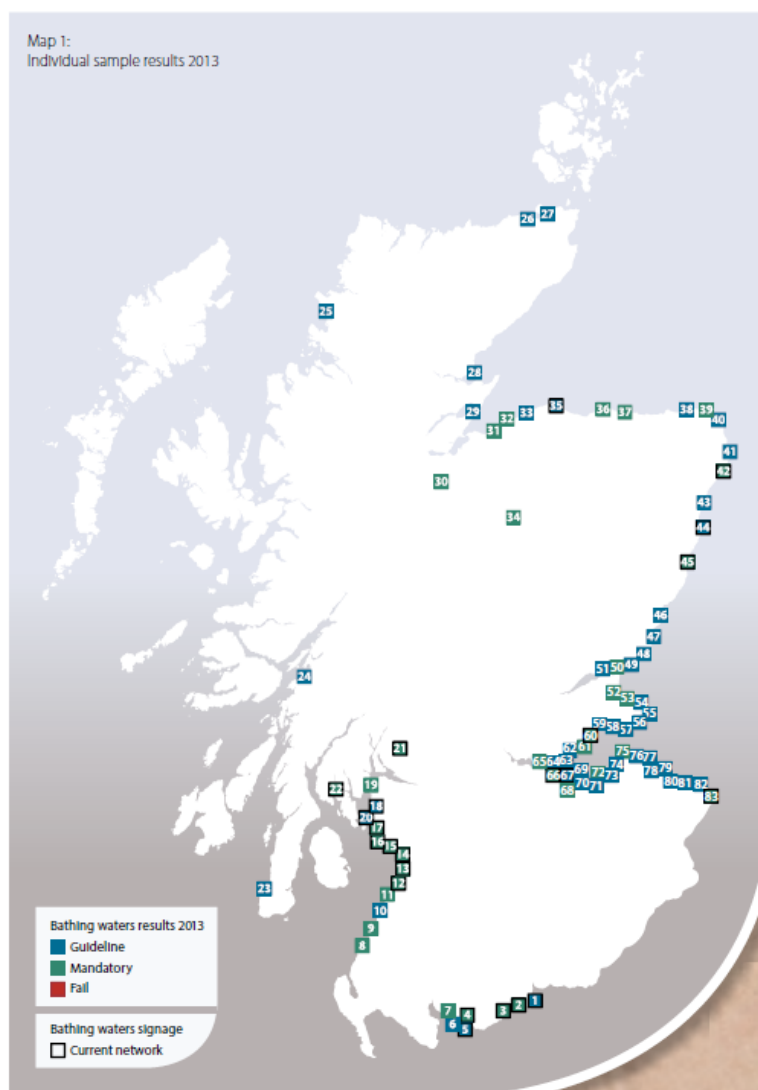
## Water Quality

### Bathing Water

Despite an exceptionally wet summer in 2014, all of Scotland's 83 bathing waters achieved the mandatory standard for bathing water quality and 57% managed to achieve the more stringent guideline standard<sup>189</sup>.

**Figure 5.5** shows compliance with the Bathing Water Directive across Scotland for the period 2013 to 2014.

Figure 5.5 Map of Bathing Water Results 2013 in Scotland



**Source:** SEPA (2014) *Scottish Bathing Waters 2013-14* <http://www.sepa.org.uk/media/39125/scottish-bathing-waters-report-2013-2014.pdf>

<sup>189</sup> Scottish Environmental Protection Agency (2014) *Scottish Bathing Waters 2013-14*. Available online at: <http://www.sepa.org.uk/media/39125/scottish-bathing-waters-report-2013-2014.pdf>

## Water Quality

### Wales

#### Water Quality

The Welsh Government reported on the River Basin Planning progress in 2015 and **Table 5.2** shows the percentage of water bodies in each River Basin District achieving poor, moderate or good status, both in 2009 and 2015<sup>190</sup>.

**Table 5.2 Overall status of water bodies as a percentage between 2009 and 2015.**

River Basin District	2009			2015		
	Poor	Moderate	Good	Poor	Moderate	Good
<b>Dee</b>	11	58	30	5	63	31
<b>Western Wales</b>	7	63	30	5	57	38
<b>Welsh part of the Severn River</b>	12	50	37	8	47	43

In 2009, 10% of all water bodies were in poor condition, 57% were in moderate condition and 33% were in good condition. Since then, many improvements have been made both in monitoring and data collection and assessment. The 2015 classification shows that the percentage of water bodies achieving good or better status has increased to 38%. The number of water bodies at poor status, meanwhile, has reduced to 6% with a resulting increase in the number of water bodies at moderate status.

In 2009 31% of surface water bodies in Wales achieved good or better ecological status. The 2015 classification results indicate that 39% of surface water bodies achieved good or better status. Improvement in status is limited by the current understanding of pressures on the water environment, their sources, and the action required to tackle them.

All 38 groundwater bodies in Wales achieved good quantitative status in 2015. For chemical status in 2009 26 groundwater bodies met good chemical status Wales. In 2015 22 are in good chemical status. This increase in the number of groundwater bodies at poor status, which is considered to be due to discharges of contaminated minewaters and the discharge of nutrient rich groundwaters into groundwater dependent terrestrial ecosystems<sup>191</sup>.

Monitoring for chemicals is based on those that are discharged in significant quantities and at locations which are considered to be at risk of failing objectives. Over twice the number of water bodies have been reported in 2015 to that in 2009, however the proportion of water bodies failing has remained broadly similar. The main reasons for water body failure in Wales are pollution from abandoned mines and contaminated land, agricultural pollution, barriers to fish migration and impoundments. Sewage discharges, acidification, forestry, flood protection and land drainage, surface water drainage from urban and transport development, abstraction and industrial discharges are also factors.

<sup>190</sup> Welsh Government (December 2015) *River Basin Planning Progress Report for Wales 2009-2015*. Available online at: <http://naturalresources.wales/media/676155/progress-report-for-wales-2009-2015-english.pdf>

<sup>191</sup> Natural Resources Wales (2015) *River basin planning progress report for Wales 2009 – 2015*. Available online at: <http://naturalresourceswales.gov.uk/media/676155/progress-report-for-wales-2009-2015-english.pdf>

## Water Quality

The 'Wales' Marine Evidence Report' (2015)<sup>192</sup> highlights that no transitional or coastal water bodies in Wales fail the assessment of chemical status, based on priority hazardous substances defined in the WFD. However, in numerous instances, ecological status /potential has not been reported as good.

All 102 bathing waters complied with the requirements of the Bathing Water Directive (2006/7/EC) in 2015. Of the 102 designated bathing waters, 82 were of an excellent standard (three more than projected in 2014), 16 achieved a good standard and four were classified sufficient standard.

NVZ's account for 2.4 per cent of land area in Wales<sup>193</sup> and the most recent review of NVZ's in Wales was undertaken by the Environment Agency Wales in 2012.

Across England and Wales new drinking water standards came into force in 2016, The Water Supply (Water Quality) (Amendment) Regulations 2016. Welsh Waters performance against the water quality tests (known as Overall Mean Zonal Compliance) for 2015 is 99.96 percent, the same as the UK average. This is an increase from 2014 (99.94 per cent) but a slight decrease from 2013 (99.97 per cent)<sup>194</sup>.

## 5.4 Summary of Existing Problems Relevant to the Water Resources NPS

The following existing problems for water quality have been identified:

- There is considerable pressure on water resources in many parts of the UK, which can in turn affect water quality.
- There is a legacy of groundwater pollution in the UK from historical mining and other industrial activities.
- Climate change is expected to have significant impacts on the water environment. Areas where the underlying geology is generally impermeable are expected to be particularly affected as river flows would be likely to fall to low levels in drier periods and quickly react to rainfall episodes.
- Many waterbodies are subject to pressure from multiple sources including rural diffuse pollution, waste water discharges, acidification and urban diffuse pollution.

## 5.5 Likely Evolution of the Baseline

### UK

The UK Climate Change Risk Assessment<sup>195</sup> identifies that at present, a clear climate-related trend in risk at a national scale cannot be distinguished for freshwater ecosystems and their services. This is due to the dominating role of large year-to-year climate variability and the influence of other factors (notably land use).

<sup>192</sup> Welsh Government (2015) Wales' Marine Evidence Report

<http://gov.wales/topics/environmentcountryside/marineandfisheries/marine-planning/other-supporting-evidence/wales-marine-evidence-report/?lang=en>

<sup>193</sup> NRW (2017). *Nitrate Vulnerable Zones*. Available online at:

<https://naturalresources.wales/water/quality/nitrate-vulnerable-zones/?lang=en>

<sup>194</sup> Discover Water. *Water quality results for all water companies*. Available online at:

<http://www.discoverwater.co.uk/quality>

<sup>195</sup> UK CCC ASC. UK Climate Change Risk Assessment 2017: CCRA2 Evidence Report. 2016.

<https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/>

## Water Quality

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Future projections for an increased incidence of warmer, drier summers are very likely to increase the risk of low flows and reduced water levels. In combination with higher water temperatures, this increases the risk of ecosystem disruption from reduced oxygen supply, thermal stress to species, reduced dilution of harmful pollutants and increased incidence of algal blooms in water bodies. Climate change would therefore provide further stress for water bodies that do not have good ecological status and may introduce new risks for water bodies that do have good status, depending on the magnitude of change.

Impacts would be exacerbated during periods of drought, although currently evidence for increased incidence of drought remains limited. The increased likelihood of more frequent periods of heavy rainfall could cause further raw water quality problems due to increased runoff/discharge of pollutants, effluents and sediments into water bodies, including elevated levels of dissolved organic carbon. In addition to environmental impacts, these problems would incur greater treatment costs for drinking water.

Risks may be further exacerbated in some catchments due to shifts towards more intensive land use, contributing greater pollution loads from diffuse sources. Depending on the rate of sea-level rise, existing freshwater aquifers may be at an increased risk of saline intrusion, with implications for drinking water supplies.

Ecosystems, particularly wetlands and woodlands, regulate and filter the flow of water through vegetation and soils (interception, evapotranspiration, infiltration, drainage, conductivity). Climate related and human-related changes to ecosystems will therefore modify their role in buffering against extreme high flows (flood risk) and low flows, in addition to their role in water circulation and purification. Increasing evidence is available for these relationships but remains incomplete<sup>196</sup>.

In the UK, 96.8% of bathing waters met the mandatory water quality in 2016. Between 2015 and 2016, 16 UK sites improved from poor to sufficient<sup>197</sup>. It is anticipated that the overall quality of bathing waters is likely to increase as water quality is improved to meet the requirements of the Bathing Water Directive.

The Environment Agency has considered five future scenarios for water and the water environment to 2030 and 2050<sup>198</sup>. Taking the reference scenario, which is considered to be the closest representation to the evolution of the baseline without the plan<sup>199</sup>, improvements were anticipated for levels of phosphorus and chemicals and metals. A degradation was predicted in relation to abstraction and flow, physical modification and invasive non-native species.

## England

The objectives of the RBMPs, required by the WFD and referenced earlier in this section, are:

- to prevent deterioration of the status of surface waters and groundwater;
- to achieve objectives and standards for protected areas;

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<sup>196</sup> UK Committee on Climate Change (2017) UK Climate Change Risk Assessment 2017. Available online at: <https://www.theccc.org.uk/tackling-climate-change/preparing-for-climate-change/uk-climate-change-risk-assessment-2017/ccra-chapters/natural-environment-and-natural-assets/>

<sup>197</sup> European Environment Agency (2016). *State of Bathing Water*. Available online at: <https://www.eea.europa.eu/themes/water/status-and-monitoring/state-of-bathing-water>

<sup>198</sup> Environment Agency (2017) *Plausible future scenarios for water and the water environment to 2030 and 2050*. Available online at: <https://www.gov.uk/government/publications/plausible-future-scenarios-for-the-water-environment-to-2030-and-2050>

<sup>199</sup> In full, the reference scenario depicts a society that is environmentally conscious, but one where personal interests often dictate behaviour. EU legislation and codes of good practice establish the standards by which the environment is managed, but short political cycles cause most long-term initiatives to fall short of these standards. Goals related to environmental sustainability are reflected in plans for economic growth, but these are often reneged when growth falls below what is expected.



## Water Quality

- to aim to achieve good status for all water bodies or, for heavily modified water bodies and artificial water bodies, good ecological potential and good surface water chemical status;
- to reverse any significant and sustained upward trends in pollutant concentrations in groundwater;
- the cessation of discharges, emissions and losses of priority hazardous substances into surface waters; and
- progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants.

Since a new assessment framework was introduced in 2009, there has been no real change in the quality of rivers within England; between 2009 and 2012 the percentage of rivers of good biological quality in England dropped from 26% to 25%. Over the same time period the percentage of rivers that passed the chemical status criteria rose from 78% to 80%.

Defra aims that by 2030, at the latest, England will have improved the quality of our water environment and the ecology which it supports, and continue to provide high levels of drinking water quality from its taps; sustainably manage risks from flooding and coastal erosion, with greater understanding and more effective management of surface water; ensure a sustainable use of water resources, and implement fair, affordable and cost reflective water charges; cut greenhouse gas emissions; and embed continuous adaptation to climate change and other pressures across the water industry and water users.

## Scotland

**Table 5.3** demonstrates that the overall percentage of water bodies in Scotland which were at good or high status in 2007 and 2014 was broadly similar for all water categories. In most cases the risks to water quality are steady or declining, the exception being estuaries.

**Table 5.3 WFD Classification Results for Water Bodies in Scotland; Percentage of Water Bodies in each Class for 2007 and 2014**

Status	High	Good	Moderate	Poor	Bad
<b>Category</b>					
Rivers (2007 Classification)	8	40	31	16	5
Rivers (2014 Classification)	7	47	24	15	5
Lochs (2007 Classification)	26	35	15	22	2
Lochs (2014 Classification)	31	36	18	14	2
Estuaries (2007 Classification)	28	16	44	4	8
Estuaries (2014 Classification)	31	55	14	0	0
Coastal Waters (2007 Classification)	57	34	9	0	0



## Water Quality

Status	High	Good	Moderate	Poor	Bad
<b>Category</b>					
Coastal Waters (2014 Classification)	32	65	3	0.2	0
Groundwater (2007 Classification)	-	76	-	24	0
Groundwater (2014 Classification)	-	78	-	22	0

Another important trend is the sources of effects. In general, environmental effects from industry are declining, whereas effects from urban development and intensification are increasing<sup>200</sup>.

The Scotland river basin district objective is to improve water quality such that 88% of water bodies will be of good or better condition by 2027<sup>201</sup>. By 2027, the objective for the Solway Tweed river basin district is for 90% of water bodies to be of good or better quality<sup>202</sup>.

As illustrated in **Figure 5.6**, the quality of bathing water has been improving since 1988. However, the results from recent years suggest that there are still challenges to ensure full compliance with the standards set out in the Bathing Waters Directive. Higher rainfall in summer and more intensive rainfall, as expected in most climate change projections, would be likely to pose significant hurdles to achieve full compliance with the standards.

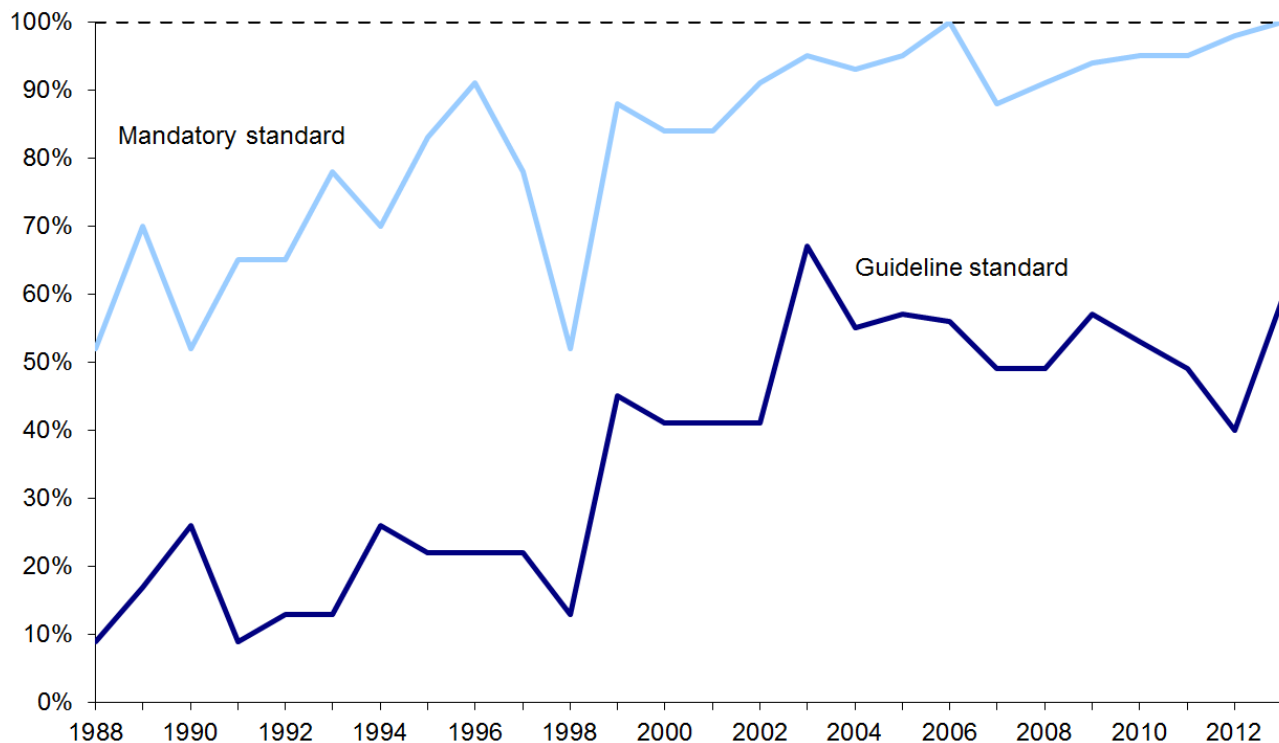
<sup>200</sup> Scottish Environmental Protection Agency (2013) *State of the environment and trends – Scotland – Water*. Available online at: <http://www.seaguidance.org.uk/11/State-of-the-Environment.aspx>

<sup>201</sup> Scottish Government (2015) *The river basin management plan for the Scotland river basin district 2015–2027*. Available online at: <https://www.sepa.org.uk/media/163445/the-river-basin-management-plan-for-the-scotland-river-basin-district-2015-2027.pdf>

<sup>202</sup> Scottish Government and Environment Agency (2015) *The river basin management plan for the Solway Tweed river basin district: 2015 update*. Available online at: [https://www.sepa.org.uk/media/218890/rbmp\\_solway\\_tweed\\_2015.pdf](https://www.sepa.org.uk/media/218890/rbmp_solway_tweed_2015.pdf)

## Water Quality

Figure 5.6 Percentage Compliance of Coastal Waters with the EC Bathing Water Directive 1988- 2013



**Source:** Scottish Government (2014) *Key Environmental Statistics 2014*. Available online at: <http://www.gov.scot/Resource/0045/00458333.pdf>

## Wales

Wales records some of the highest rainfall levels in the UK and relies on this rainfall which is collected in the rivers, lakes and reservoirs as sources of water supply. However, in significant parts of Wales, there are no further reliable supplies of water available for new abstractions. Whilst population increase estimates are lower for Wales than for many other parts of the UK, growth will place further pressure on water resources. Climate change is also expected to have significant effects on river flows in Wales, with most major watercourses experiencing a 10-15% increase in mean monthly winter flows and 50-80% decreases in summer flows. These predictions are generally more pronounced than in England, primarily due to the lack of groundwater storage capacity in Wales.

Under the WFD, rivers in England and Wales were required to have achieved 'good ecological status' by 2015. Where this was not possible and subject to criteria set out in the Directive, the aim is to achieve good status by 2021 or 2027. The second River Basin Management Plan cycle, 2015 – 2021 recognises the large degree of uncertainty about achieving such significant increases to achieve good status or better by 2021. NRW propose in Wales to improve compliance with good status by delivering measures locally in an integrated way to achieve improvements. This will involve targeting 21 water bodies in the Western Wales River Basin District<sup>203</sup> and seven in the Dee River Basin District<sup>204</sup>. In addition, a total of 17 water bodies of the Severn River Basin District within Wales are targeted by Natural Resources Wales for improvement.

<sup>203</sup> Western Wales River Basin Management Plan 2015 – 2021 Summary December 2015. Available online at: <https://naturalresources.wales/media/676165/wwrbdsummary.pdf>

<sup>204</sup> Dee River Basin Management Plan 2015 – 2021 Summary Updated December 2015 <https://www.naturalresourceswales.gov.uk/media/676146/deerbdsummary.pdf>

## Water Quality

The State of Natural Resources Report (SoNaRR)<sup>205</sup> highlights that climate change may affect groundwater recharge in Wales and that by 2025, it is likely that groundwater recharge will decrease, resulting in decreased dry weather river flows and a general lowering of groundwater levels. This may have impacts on base-flow to rivers and wetlands in dry periods and affect small domestic and agricultural water supplies.

## 5.6 Assessing Significance

The objectives and guide questions related to water quality and resources which have been identified for use in the appraisal of the effects of Water Resources NPS proposals are set out in **Table 5.4**, together with reasons for their selection.

**Table 5.4** Approach to Assessing the Effects of the Water Resources NPS Proposals on Water Quality

Objective/Guide Question	Reasoning
<b>Objective: To protect and enhance water quality and help achieve the objectives of the Water Framework Directive.</b>	The SEA Directive (2001/42/EC) requires that likely significant effects on water be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.  The construction of water resources infrastructure can have adverse impacts on water quality due to, for example, pollution. The operation of water resources infrastructure can have both positive and negative impacts on water quality associated with, in particular, changes to water levels as a result of abstraction or discharge. The inclusion of this AoS objective ensures that these effects can be considered within the AoS.
Will the Water Resources NPS protect and improve surface, ground, estuarine and coastal water quality?	The Water Framework Directive (2000/60/EC) requires the setting of objectives that aim for all inland, coastal and groundwater water bodies to reach a 'good' chemical and ecological status (or for heavily modified water bodies this is 'good' ecological potential). Where this is disproportionately expensive or technically infeasible, member states may extend time limits as far as 2027, set alternative less stringent objectives or in extreme circumstances request a temporary derogation. Current WFD classifications indicate that there are still a large proportion of surface water bodies in England (and Wales) that are classified as being of Moderate Ecological status/potential or less. Government strategies such as the Water resources strategy for England and Wales (2009) and Water for Life (2011) include objectives to protect and improve the quality of water bodies.
Will the Water Resources NPS prevent the deterioration of Water Framework Directive waterbody status (or potential)?	
Will the Water Resources NPS ensure a new activity or new physical modification does not prevent the future achievement of good status for a water body?	
Will the Water Resources NPS support the achievement of protected area objectives such as groundwater source protection zones and nitrate vulnerable zones?	Drinking water protected areas are bodies of surface water or groundwater: (i) used, or planned to be used, for the abstraction of water intended for human consumption; and (ii) providing, or planned to provide, a total of more than 10 cubic metres of water per day on average, or serving, or planned to serve, more than 50 people.
Will the Water Resources NPS support the achievement of environmental objectives set out in River Basin Management Plans?	There are 11 River Basin Districts which each require (under the WFD) a River Basin Management Plan (RBMP) including objectives for surface water, groundwater, transitional and coastal water bodies.

**Table 5.5** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the population objective.

<sup>205</sup> Natural Resources Wales (2016) *The State of Natural Resources Report (SoNaRR)*. Available online at: <https://naturalresources.wales/our-evidence-and-reports/the-state-of-natural-resources-report-assessment-of-the-sustainable-management-of-natural-resources/?lang=en>

## Water Quality

Table 5.5 Illustrative Guidance for the Assessment of Significance for Water Quality

Effect	Description	Illustrative Guidance
++	Significant Positive	<ul style="list-style-type: none"> <li>Option would significantly decrease the amount of waste water, surface run-off and pollutant discharges so that the quality of water receptors (including groundwater, surface water, sea water or drinking water receptors) would be significantly improved and sustained and water targets (including those relevant to chemical and ecological condition) reached and exceeded;</li> <li>Option would significantly improve surface, ground, estuarine and coastal water quality;</li> <li>Option would improve Water Framework Directive waterbody status (or potential).</li> </ul>
+	Positive	<ul style="list-style-type: none"> <li>Option would lead to minor decreases in the amount of waste water, surface run-off and/or pollutant discharges so that the quality of water receptors (including groundwater, surface water, sea water or drinking water receptors) may be improved to some level temporarily and some water targets (including those relevant to chemical and ecological condition) would be reached/exceeded;</li> <li>Option would improve surface, ground, estuarine and coastal water quality.</li> </ul>
0	Neutral	<ul style="list-style-type: none"> <li>Option would not change the amount of waste water, surface run-off and/or pollutant discharges such that the quality of water receptors would not be affected;</li> <li>Option would not affect Water Framework Directive waterbody status (or potential).</li> </ul>
-	Negative	<ul style="list-style-type: none"> <li>Option would lead to minor increases in the amount of waste water, surface run-off and/or pollutant discharges so that the quality of water receptors (including groundwater, surface water, sea water or drinking water receptors) may be decreased to some level temporarily and it may prevent some water targets (including those relevant to chemical and ecological condition) from being achieved;</li> <li>Option would decrease (directly or indirectly) surface, ground, estuarine and coastal water quality.</li> </ul>
--	Significant Negative	<ul style="list-style-type: none"> <li>Option would lead to major increases in the amount of waste water, surface run-off and/or pollutant discharges so that the quality of water receptors (including groundwater, surface water, sea water or drinking water receptors) would be considerably increased and some or all water targets (including those relevant to chemical and ecological condition) would not be achieved;</li> <li>Option would significantly decrease (directly or indirectly) surface, ground, estuarine and coastal water quality;</li> <li>Option would lead to a deterioration in Water Framework Directive waterbody status (or potential) where there is a requirement to justify permitting of the option under the provisions of Article 4.7 of the Water Framework Directive.</li> </ul>
?	Uncertain	<ul style="list-style-type: none"> <li>From the level of information available, the effect that the option would have on this objective is uncertain.</li> </ul>

## Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 5.6** presents the appraisal of the likely significant effects of the draft NPS and the and the 'no NPS' reasonable alternative on the water quality (including surface and ground water quality and availability) objective. The appraisal considers in-turn the three sub-sections used for each topic within Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making and Mitigation. The performance of the draft NPS and the and the 'no NPS' reasonable alternative are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters 1 – 3 of the draft NPS outlining how the

## Water Quality

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remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the two reasonable alternatives is then summarised along with any proposed mitigation measures.

## Water Quality

Table 5.6 Appraisal of the Draft NPS and Reasonable Alternatives: Water Quality\*

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	+	+/?	<p><b>Draft NPS:</b> The text in the draft NPS under the heading of 'Applicant's Assessment' states:</p> <p>4.15.6 <i>"The applicant should make early contact with the relevant regulators, including the local authority, the EA and MMO where appropriate, for relevant licensing and environmental permitting requirements. Where the proposed development is likely to have adverse effects on the water environment, the applicant should undertake an assessment of the existing status and impacts of the proposed development on water quality, water resources and physical characteristics as part of the Environmental Statement. A project specific WFD assessment may also be required."</i></p> <p>General guidance on the likely contents that should form part of the Environmental Statement (ES) is provided in para 4.15.7:</p> <ul style="list-style-type: none"> <li>• <i>"the existing quality of waters affected by the proposed project;</i></li> <li>• <i>existing water resources affected by the proposed project and the impacts of the proposed project on water resources;</i></li> <li>• <i>existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project, and any impact of physical modifications to these characteristics;</i></li> <li>• <i>any impacts of the proposed project on water bodies or protected areas under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 including groundwater resources, bathing or coastal waters;</i></li> <li>• <i>the likely range of impacts on existing water quality, resources, physical characteristics of the water environment and waterbodies or protected areas due to climate change, and</i></li> <li>• <i>any cumulative effects."</i></li> </ul> <p>The text goes on to state in para 4.15.9 that the "Movement of 'raw' (untreated) water supplies risks spreading invasive non-native species between abstracted and receiving waters. Some degree of water treatment may therefore be required. Where necessary, an assessment of the increased risk to water quality that the project poses (that is considering existing pathways and potential for spread via these) should be submitted. The assessment should detail the measures required to mitigate the risk. As part of the WRMP options appraisal process, water companies are required to undertake a similar assessment and this will help to identify risks and mitigation measures."</p>

## Water Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>The requirement for early engagement with the relevant regulators, provision of guidance in terms of an ES (and where relevant a Water Framework Directive (WFD) Assessment) and identification of mitigation measures will help to ensure that the likely effects of the construction and operation of water resources infrastructure on water quality are properly considered.</p> <p>Overall, the draft NPS has been assessed as having a positive effect on this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>There is the potential for this section to require that applicants consider the information provided in support of WRMPs (including WFD Assessments) and effects on bathing water quality, although it is recognised that this is currently captured in the introduction to section 4.15 of the draft NPS.</p> <p>Reference in this section could be included to opportunities to enhance the water environment.</p> <p>Consideration could be given to the provision of the following additional guidance on the contents of the ES, which in turn serves as the reference point for the detail of the 'Decision Making' section:</p> <ul style="list-style-type: none"> <li>• Scoping <ul style="list-style-type: none"> <li>○ Identify the likely zone of influence of the proposed development.</li> <li>○ Describe the surface water and groundwater environment in the study area likely to be affected;</li> <li>○ Describe any future anticipated changes to surface water and groundwater quality in the absence of the proposed scheme, to inform the assessment of impacts;</li> <li>○ Provide the basis for determining significance of effects arising from the impacts.</li> </ul> </li> <li>• Impact assessment <ul style="list-style-type: none"> <li>○ Identify the potential impacts on water quality including in respect of the achievement of River Basin Management Plan (RBMP) objectives and characterise these impacts and their effects (including scale, duration and significance);</li> <li>○ Assess the potential impacts on the marine environment (including bathing water quality) together with a requirement for early engagement with the Marine Management Organisation (MMO) (where appropriate) and consideration of marine plans;</li> </ul> </li> </ul>

## Water Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>○ Consider the findings and recommendations of any WFD Assessment prepared in support of the relevant WRMP and project;</li> <li>○ Assess the potential effects on aquatic ecology and habitats including a cross-reference to Section 4.3 of the draft NPS;</li> <li>○ Assess the residual impacts of the scheme remaining after mitigation and the significance of their effects, including cumulative effects.</li> <li>• Avoidance, mitigation, compensation and enhancement <ul style="list-style-type: none"> <li>○ Identify and incorporate measures to avoid, reduce and compensate impacts on water quality, including opportunities to enhance the water environment;</li> <li>○ Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.</li> </ul> </li> </ul>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of extant national planning policy and the EIA Regulations which require consideration of the effects of development proposals on water quality. Environmental permits for (inter alia) the abstraction of water, impounding of water and discharges would also be required alongside a Marine License for works affecting marine areas. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on water quality. In consequence, even without the NPS, this alternative would still be considered to have a positive effect in relation to water quality. However, the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level and could undermine the opportunities to enhance the water environment.</p>
<b>Decision Making</b>	<b>+</b>	<b>+/?</b>	<p><b>Draft NPS:</b> The draft NPS states in the 'Decision Making' section that:</p> <p>4.15.11 "The Secretary of State will need to give impacts on the water environment more weight where a development would have adverse effects on the achievement of the environmental objectives established under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017."</p>



## Water Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>The text goes on to state at para 4.15.12 that <i>"The Secretary of State should be satisfied that a proposal has had regard to the River Basin Management Plans and the requirements of the WFD, including Article 4.7, and those on priority substances and groundwater. The specific objectives for particular river basins are set out in River Basin Management Plans."</i></p> <p>At para 4.15.13, the draft NPS emphasises the need for the Secretary of State to consider mitigation measures proposed by the applicant and whether appropriate requirements should be attached to any development consent and/or whether planning obligations are necessary.</p> <p>In stating that the Secretary of State will need to give due consideration to impacts on the water environment in the context of the WFD and RBMPs, and taking into account the provisions relating to mitigation/planning obligations, the draft NPS has been assessed as having a positive effect on water quality.</p> <p><u>Recommendations for Improvement</u></p> <p>It is considered that the guidance provided in this section of the draft NPS could be more definitive in respect of the circumstances in which the Secretary of State would refuse consent due to unacceptable impacts on water quality.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of extant national planning policy and the EIA Regulations. Environmental permits for the discharge of contaminated water may also be required alongside a Marine License for works affecting marine areas. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on water quality. This is expected to help ensure that water quality is not compromised by the water resources infrastructure development, generating a positive effect on water quality. However, the absence of a clear statement regarding the full range of considerations to be taken into account by the Secretary of State (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level.</p>
Mitigation	+	+/?	<p><b>Draft NPS:</b> In the 'Mitigation' section, the draft NPS states:</p> <p>4.15.14 <i>"The Secretary of State will need to consider whether the mitigation or enhancement measures put forward by the applicant which are needed for operation and construction are acceptable."</i></p> <p>This section goes on to set out that impacts on water quality can be reduced through careful design to facilitate adherence to good pollution control practice and to any national standards for sustainable drainage systems. More specific mitigation measures relating to both the construction and operational phases of development are provided in the 'Introduction' section.</p>

## Water Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>Overall, the guidance provided in this section of the draft NPS is expected to help ensure that adverse effects on water quality arising from water resources infrastructure are minimised, generating a positive effect on this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>Reference could be made in this section to requirements for the preparation of environmental management plans to help minimise adverse effects on water quality during construction and operation of the water resources infrastructure.</p> <p>To inform the appraisal of section 4.15 of the draft NPS, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on water quality has been undertaken. This review is intended to help identify where any additional measures could be included in the draft NPS (in the introduction or mitigation section of the topics) to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p> <p>The following text identifies the anticipated water quality impacts and associated mitigation measures. These have been identified within the draft NPS but are discussed again here to provide the necessary context for the recommended mitigation measures.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p> <p><i>Construction</i></p> <p>Reservoir development can have a wide range of impacts on water quality. In particular, there is the potential for contamination to affect groundwater, surface water (including any existing reservoir) and water courses. There may also be changes to the hydrological regime, continuity, and morphological conditions of associated rivers (particularly in respect of impoundment reservoirs).</p> <p><i>Operation</i></p> <p>The water quality requirements of a reservoir are closely related to the various functions that a reservoir may be required to undertake, which can include water supply, flood control, hydropower, navigation, wildlife conservation and recreation. Where reservoirs are to be used to supply potable water, there is a strong emphasis on water quality as phytoplankton blooms can cause taste problems in drinking water. Impaired water quality, such as the presence of iron and manganese, can increase treatment costs.</p> <p>The operation of new reservoirs (and impounding reservoir in particular) has the potential to result in long term water quality changes due to, for example, reduce downstream flows which can result in a failure meet WFD objectives.</p>

## Water Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>Water Transfer Schemes</b></p> <p><i>Construction</i></p> <p>The construction of water transfer schemes and associated development may result in contamination which could affect groundwater, surface water and water courses. Water courses are at particular risk where a water transfer scheme crosses a waterway. Effects in this regard can include:</p> <ul style="list-style-type: none"> <li>• the loss or damage of habitats and species;</li> <li>• creating a barrier to the movement of fish and other wildlife;</li> <li>• preventing sediment and woody debris being moved downstream; and</li> <li>• prevention of natural river movement.</li> </ul> <p><i>Operation</i></p> <p>Water transfer schemes can adversely affect various parameters of water quality including chemical composition and oxygen content. The effects are dependent on the baseline water conditions of the two water bodies that the water transfer is taking place between. The rate of transfer and seasonal timing can also have a significant effect on factors such as iron concentration and the growth of cyanobacteria. These effects in turn could lead to a failure to meet 'good ecological status' or 'good ecological potential' under the WFD. However, the transfer of water could increase water in the receiving system which may help to enhance water quality.</p> <p><b>Desalination</b></p> <p><i>Construction</i></p> <p>The construction of desalination plants may result in contamination which could affect groundwater, surface water and coastal water quality.</p> <p><i>Operation</i></p> <p>The desalinisation process produces highly concentrated brine as a by-product, which is discharged back into the marine environment. If this discharge is not sufficiently dispersed it can adversely affect water quality. There may also be effects associated with increased turbidity and seawater temperatures.</p>

## Water Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>Potential additional mitigation measures identified through a review draft WRMPs and their associated SEA Environmental Reports include:</b></p> <ul style="list-style-type: none"> <li>A number of treatment options are available to maintain water quality in reservoirs. These include: <ul style="list-style-type: none"> <li>destratification;</li> <li>hypolimnetic aeration/oxygenation;</li> <li>underwater dam;</li> <li>pool drawdown;</li> <li>dilution;</li> <li>phosphorus inactivation;</li> <li>sediment removal;</li> <li>harvesting;</li> <li>biological controls; and</li> <li>herbicides and algicides.</li> </ul> </li> </ul> <p><b>No NPS:</b> Under this alternative, it is expected that appropriate mitigation measures would, in the first instance, be identified as part of the WRMP process and, subsequently, be considered by the competent authority in light of the proposals submitted. As such, mitigation measures would be applied but there is the risk that this is open to interpretation and thereby does not fully address an appropriate range of activities which are directly related to the scheme.</p> <p>Overall, even without the NPS, this alternative would still be considered to have a positive effect in relation to this AoS objective, although a degree of uncertainty persists.</p>
<b>Other Sections of the Draft NPS Relevant to Water Quality</b>	<p>The following provides additional commentary on the text in the other sections of the draft NPS relevant to water quality. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b><u>1 Introduction</u></b></p>		

## Water Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>1.1. Background and scope of this NPS</b> - With regards to para 1.1.8, there is an opportunity for the consideration of effects on water quality in a specific locality through the preparation of a local impact report submitted by a local authority in accordance with the Planning Act. There is no prescribed format for local impact reports but there is clearly an opportunity for a local authority to comment on water quality as an issue, helping to ensure that consideration is given to likely effects in a particular locality.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on water quality in Scotland, Wales and Northern Ireland.</p> <p><b>1.3. Infrastructure covered by the Water Resources NPS</b> – as part of the options identification and appraisal process (including WFD Assessment, HRA and SEA undertaken in support of WRMPs) early consideration will be given to the impacts of options on water quality.</p> <p><b>1.8. Habitats considerations</b> –the application of the HRA to the draft NPS will help ensure that the interests of European designated nature conservation sites are given proper consideration (including in respect of water quality impacts), notwithstanding the fact that there remains uncertainty over potential impacts, particularly in respect of the absence of specific locations and likely effects within the draft NPS.</p> <p><b><u>2. Government policy and the need for water resources infrastructure</u></b></p> <p><b>2.2. Pressure on water availability now and in the future</b> – this section makes specific reference to protecting and enhancing the environment as a key driver of the need for nationally significant water resources infrastructure. With specific regard to water quality (and quantity), the draft NPS states “</p> <p>2.2.11 <i>“The UK is home to globally important wetlands, rivers and chalk streams, the healthy existence of which depends on water availability. Having the right flow in our rivers and protecting groundwater levels is essential to supporting healthy ecology and enhancing natural resilience to drought. The impacts of climate change and the growing demand for water is putting added pressure on this availability.”</i></p> <p>2.2.12 <i>“The abstraction of water from the environment can alter the natural flow regime. Current levels of water abstraction from some sources will need to be reduced to protect the environment and help sustain important heritage assets, in line with the Water Abstraction Plan and River Basin Management Plans. In ‘A Green Future’, the government set out its commitment to reduce damaging abstraction of water from rivers and groundwater, while maintaining and improving water supply resilience now and in the future. The challenge in delivering this will increase in the future due to the impacts of climate change and population growth.”</i></p> <p><b>2.5. The role of water resource management plans in identifying the need</b> – as noted, as part of the options identification and appraisal process (including WFD Assessment) undertaken in support of WRMPs, early consideration will be given to the impacts of options on water quality.</p> <p><b>2.6 The need for new water resources infrastructure projects</b> – the section identifies that alongside reservoirs, water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP, when assessed against the relevant threshold in the Planning Act 2008 or</p>

## Water Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>through a section 35 referral. These infrastructure types may have water quality impacts of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p> <p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p><b>3. Assessment Principles</b></p> <p><b>3.1 General principles of assessment</b> - the provisions of the Planning Act 2008 and the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, provides the starting point for consideration of water quality issues.</p> <p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including WFD Assessment) undertaken in support of WRMPs, early consideration will be given to the impacts of options on water quality.</p> <p><b>3.2 Environmental Impact Assessment</b>– the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that impacts on water quality are fully considered, as will the consideration of cumulative effects and interrelationships between effects. This section specifically states that information gathered from the WRMP options appraisal assessments including WFD Assessment will be useful to identify the significant effects of a proposed project.</p> <p><b>3.3 Habitats Regulations Assessment</b> – requirements in relation to the Habitats Directive may help to protect water bodies where they are related to water-dependent Natura 2000 sites.</p> <p><b>3.4. Environmental Net Gain</b>- consideration of opportunities for environmental net gain during the WRMP options appraisal process and in the detailed design of schemes will help to ensure protection and (where possible) enhancement of water quality. It is noted that this section advises that water companies consider using natural capital accounting and ecosystem services assessments to inform planning and underpin environmental improvements and that <i>"Applications for development consent must be accompanied by a statement demonstrating how opportunities for environmental net gain have been incorporated into the detailed design (including any relevant operational aspects) of the project"</i>.</p> <p><b>3.5 Assessing Alternatives</b> – the identification that reasonable alternatives will be required as part of scheme design and project planning should ensure that impacts on water quality are taken into account, both in terms of protection and opportunities for mitigation and enhancement.</p> <p><b>3.6 Criteria for 'good design' for water resources infrastructure</b> – the requirement for applicants to include design as an integral consideration from the outset of a proposal is expected to help ensure that measures are adopted to minimise the use of resources including water. Good design, in terms of siting and use of appropriate technologies and landscaping can also help to mitigate adverse impacts on water quality (for example, by reducing surface water run-off).</p>

## Water Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<p><b>3.7 Climate Change Adaptation</b> – ensuring that development is adaptable to the effects of climate change will in-turn help to ensure that proposals take into account the impacts of climate change when considering water quality. Climate change adaptation measures could also help to reduce flood risk with consequential benefits in respect of water quality.</p> <p><b>3.8 Environmental Regulation</b> - issues relating to discharges from a proposed project which affect, inter alia, water quality and resources will be subject to separate regulation under the pollution control framework or other consenting or licensing regimes. At paragraph 3.8.8, the draft NPS sets out that the <i>"The Secretary of State should be satisfied that development consent can be granted taking full account of environmental impacts. This will require close cooperation with the Environment Agency and/or the pollution control authority, and other relevant bodies, such as the MMO, Natural England, Drainage Boards, and water and sewerage undertakers, to ensure that in the case of potentially polluting developments:</i></p> <ul style="list-style-type: none"> <li><i>the relevant pollution control authority is satisfied that potential releases can be adequately regulated under the pollution control framework; and</i></li> <li><i>the effects of existing sources of pollution in and around the project are not such that the cumulative effects of pollution when the proposed development is added would make that development unacceptable, particularly in relation to statutory environmental quality limits."</i></li> </ul> <p>This is expected to help ensure that potential impacts on water quality are fully taken into account.</p> <p><b>3.12 Health</b> – this section highlights the relationship between water quality and human health.</p>		
<b>Summary Appraisal of Likely Significant Effects</b>	+	+/?	<p><b>Draft NPS:</b> The construction and operation of new water resources infrastructure can have a wide range of both positive and negative effects on water quality depending on the type, scale and location of development and the baseline water environment. Effects during construction may be associated with, for example, the discharge of contaminants or changes to the hydrological regime, continuity, and morphological conditions of associated waterbodies. During operation, meanwhile, effects may be related to changes to the physio-chemical status of waterbodies or flow variation. In this context, the draft NPS requires (in liaison with key regulators and other bodies with an interest in the water environment) that potential impacts on water quality are identified, assessed and, where necessary, mitigated. This is expected to help protect surface water, groundwater, estuarine and coastal water quality.</p> <p>Overall, the draft NPS is considered to provide a clear framework to guide decisions on new water resource infrastructure in respect of the water environment. It complements existing national planning policy and legislation as well as the objectives of RBMPs in respect of the WFD and the development of WRMPs. In consequence, the draft NPS has been assessed as having a positive effect on this objective.</p>

## Water Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of extant national planning policy and the EIA Regulations which require consideration of the effects of development proposals on water quality. Environmental permits for (inter alia) the abstraction of water, impounding of water and discharges would also be required alongside a Marine License for works affecting marine areas. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on water quality. In consequence, even without the NPS, this alternative would still be considered to have a positive effect in relation to water quality. However, the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level and could undermine the opportunities to enhance the water environment.</p>
<p><b>Summary of Recommended Mitigation and Enhancement</b></p>	<p>The draft NPS makes a positive contribution to the water quality AoS objective. It identifies a range of issues that should be considered in terms of preparing and determining an application and identifying appropriate mitigation. However, section 4.15 of the draft NPS could be enhanced through, in particular:</p> <ul style="list-style-type: none"> <li>• provision of guidance for applicants in respect of opportunities for the enhancement of the quality of the water environment;</li> <li>• inclusion of a reference to Environmental Management Plans;</li> <li>• provision of further guidance on the possible contents of an ES;</li> <li>• provision of more definitive guidance in respect of the circumstances in which the Secretary of State would refuse consent due to unacceptable impacts on water quality;</li> <li>• inclusion of a specific requirement for applicants to consider the information provided in support of WRMPs (including WFD Assessments) and effects on bathing water quality;</li> <li>• provision of more detailed guidance in respect of the assessment of the operational impacts of water resources infrastructure, for example, in respect of the discharge of brine from desalination plants and changes to downstream flows associated with reservoirs and transfers;</li> <li>• inclusion of WFD Assessment as a specific sub-heading (in Section 3 of the draft NPS).</li> </ul> <p>No additional project-level mitigation beyond that already set out in the draft NPS has been identified, although reference could be included to the treatment options available to maintain water quality in reservoirs.</p>		



## Water Quantity

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# 6. Water Quantity

## 6.1 Introduction

This section presents the overview of the plans, programmes and baseline information for the appraisal of sustainability of the National Policy Statement for Water Resources in respect of water quantity.

Water quantity within this context is defined as inland surface freshwater and groundwater resources.

There are links between water quality/resources and a number of other Appraisal of Sustainability (AoS) topics, in particular the effects and interactions of water quantity on biodiversity, human health, flood risk and climatic factors.

**It should be noted that for the purposes of this Report, water quality and water quantity have been discussed as two separate topics. However, the two topics are very closely related and in the majority of cases the both the plans and programmes and the baseline data discussed under one topic could also be discussed under the other. Therefore, to avoid unnecessary duplication in the majority of instances a given item or issue is only discussed under the topic to which it is most directly relevant.**

## 6.2 Review of Plans and Programmes

Levels of rainfall vary substantially across Britain, with Wales, Scotland and the north of England experiencing higher levels of rainfall than the south and east of England. The south and east also have some of the highest demand for potable water. As such, long term plans and policies have been produced by and between governments, water companies and other key stakeholders to ensure that suitable supplies can be maintained to cope with drought conditions and in a future of increased demand and a changing climate.

### International/European

The aspects of the **Water Framework Directive (WFD) (2000/60/EC)** relating directly to water quality are discussed under Section 5 – Water Quality of this report. The Directive aims at maintaining and improving the aquatic environment in the Community. Whilst the Directive is primarily concerned with the quality of the waters concerned, the control of quantity is recognised as an ancillary element in securing good water quality and therefore measures on quantity, serving the objective of ensuring good quality, are established.

In addition, the Directive recognises that the quantitative status of a body of groundwater may have an impact on the ecological quality of surface waters and terrestrial ecosystems associated with that groundwater body. There is only a certain amount of recharge into a groundwater each year, and of this recharge, some is needed to support connected ecosystems (whether they be surface water bodies, or terrestrial systems such as wetlands). For good management, only that portion of the overall recharge not needed by the ecology can be abstracted - this is the sustainable resource, and the Directive limits abstraction to that quantity.

One of the innovations of the Directive is that it provided a framework for integrated management of groundwater and surface water for the first time at European level. River Basin Management Plans are required to provide a detailed account of how the objectives set for the river basin including ecological status, quantitative status, chemical status and protected area objectives are to be reached within the timescale required.

## Water Quantity

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### UK

In 2016, the UK Government published an updated **National Infrastructure Delivery Plan**. This sets out the Government's plan to 2021 and beyond and takes a targeted approach to infrastructure investment and delivery across different sectors. It contains major commitments to improve the UK's transport, energy, communications, waste, water, housing and science and research infrastructure as well as steps to attract new private sector investment. With regards to water infrastructure, the plan identifies the Thames Tideway Tunnel as the key priority to 2021. This is the second project to address the 39 million tonnes of sewage that has been released into the Thames in recent years, the first project being the Lee Tunnel, which was completed in early 2016.

The **Water resources long term planning framework (2015-2065)** seeks to develop a high-level strategy and framework for the long term planning of water resources for Public Water Supply in England and Wales. In turn, it provides an assessment of the key challenges facing public water supplies in England and Wales up to 50 years in future, in terms of the current planning process (water resource management plans and drought plans) and approaches used, and in particular, in terms of the levels of drought resilience that are planned, and how these differ across the country. Key recommendations include the need for further work in a number of areas to better understand future scenarios. These include the further development of datasets and models, requirements for improved climatic scenarios and better water demand and drought forecasting.

The **Water Industry Act 1991 (as amended by the Water Act 2003)** requires water undertaker to prepare and maintain Drought Plans under Section 39B and 39C of the Water Industry Act 1991. A drought plan is a plan for how the water undertaker will continue, during a period of drought, to discharge its duties to supply adequate quantities of wholesome water. Such plans include the definitions used to define a drought, how water will be managed during a drought and how drought management will be improved in the future. The Act also requires water undertakers in England and Wales to prepare and maintain a water resources management plan (WRMP). Fundamentally, WRMPs show how a water company will be able to provide a secure supply of water to customers over a 25-year period at an affordable price and without significant adverse effects on the environment. WRMPs must take into account anticipated population growth, future housing, economic growth and climate change.

**Water 2020: our regulatory approach for water and wastewater services in England and Wales** sets out Ofwat's future regulatory framework for the water and wastewater industry in England and Wales. It outlines the changes to company licences that flow from the new regulatory framework. It also sets out specific areas for further consultation about the role of markets and the regulatory framework for the 2019 price review.

### England

The **National Planning Policy Framework (MHCLG, 2018)** sets out the core land use planning principles that should underpin both plan-making and decision taking. Local planning authorities are expected to set out the strategic priorities for their area in the Local Plan including strategic policies to deliver the provision of infrastructure for water supply.

The **UK Government response to consultation on reforming the Water Abstraction Management System (2016)** sets out Defra's proposed plans for reforming the abstraction management system in England following extensive consultation. Key aspects of the reformed abstraction system include:

- Abstraction permits that reflect current business use, with unused abstraction volumes removed subject to appeal.
- Water storage will be permitted at any time flows are sufficiently high

## Water Quantity

- All abstractors directly affecting surface water will have conditions on their permits that enable flow based controls to protect the environment; and
- A more efficient permit trading systems to allow abstractors to deal with low flows.

In response to the above proposals for revising the water abstraction system, the Environment Agency published **Managing Water Abstraction (2016)**, which sets out how the Environment Agency will manage water resources in England. It explains the technical, legal and policy requirements behind the abstraction licensing strategies. It also discusses the relationship between drought management plans, WRMPs and abstraction management, noting that the Environment Agency publishes its own drought plan; **Drought response: our framework for England (2017)**. The Environment Agency's drought plan explains how drought affects England and how the Environment Agency works with government, water companies and others to manage the effects on people, business and the environment. It aims to ensure consistency in the way the Environment Agency coordinates drought management across England. The Environment Agency sets out its approach to balancing abstraction demands against the need to maintain desired ecology, particularly of surface water, through its **Catchment Abstraction Management Strategies (CAMS)** applicable to catchments in England and Wales.

Defra's **Creating a great place for living: Enabling resilience in the water sector (2016)** set out the Government's approach to enhancing the policy framework for the water sector to secure the long-term resilience of the sector, helping to deliver a cleaner, healthier environment, benefiting people and the economy. This is supported and informed by the Environment Agency's advice to Defra **Water supply and resilience and infrastructure (2015)**.

The **Government's Strategic Priorities for Ofwat: Affordable, Resilient Water Supplies (2017)** sets out the strategic priorities and objectives for Ofwat, the independent economic regulator of the water industry. It sets a strategic objective for Ofwat to further a reduction in the long-term risk to water supply resilience from drought and other factors, including through new supply solutions, demand management and increased water trading.

**A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)** includes policies and actions to reform the approach to water abstraction, increasing water supply and incentivising greater water efficiency and less personal use. The Plan sets out a target to support Ofwat's ambitions on leakage, minimising the amount of water lost through leakage year on year, with water companies expected to reduce leakage by at least an average of 15% by 2025.

## Scotland

Scotland's **National Water Scarcity Plan** sets out how water resources will be managed prior to and during periods of prolonged dry weather. This is to ensure the correct balance is struck between protecting the environment and providing resource for human and economic activity.

## Wales

The **Water Strategy for Wales (2015)** sets out the strategic direction for water policy in Wales over the next 20 years and beyond. The aim is to ensure Wales has a more integrated and sustainable approach to managing water and associated services in Wales. The Strategy aims there are sufficient, reliable water resources and waste water services available in Wales and that these are sustainable and resilient to future changes. The Strategy will contribute to the implementation of the natural resource management policy.

## Water Quantity

### 6.3 Overview of the Baseline

#### UK

Over the past five years, there has been a downward trend in the amount of water that households are using each day, although fluctuations can be seen throughout the years. However, in 2015-16, there was a slight increase in the amount of water that customers use each day, averaging 139.5 litres per person per day. Unmetered households use more water (around 30 litres per person per day more) than metered households. In Scotland, domestic water use accounts for 841.64 MI/d or 150 litres per person per day (2013-14). A declining trend has been observed since (2008/09). Average water use in Northern Ireland is 145 litres per person per day<sup>206</sup>.

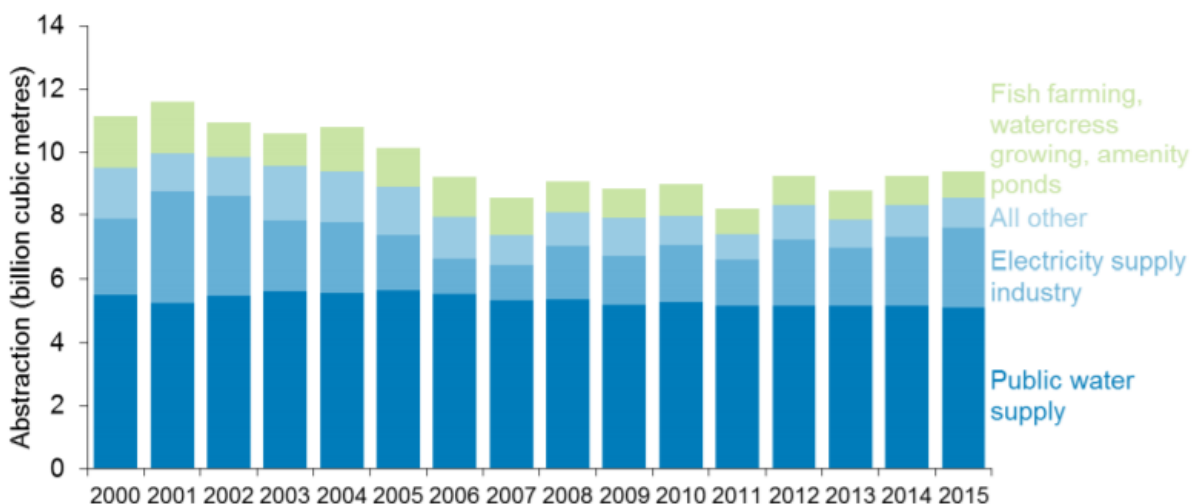
#### England and Wales

##### Abstraction

The abstraction of water from non-tidal surface water and groundwater in England and Wales had fallen steadily from the peak of an estimated 11.6 billion cubic metres in 2001 to 8.2 billion cubic metres in 2011. However, since 2011, total abstraction has increased by 14% to 9.4 billion cubic metres, driven mostly by abstraction for electricity generation, which increased from 1.4 billion cubic metres in 2011 to 2.5 billion cubic metres in 2015. This is in contrast to the statistics for 2016 which showed that abstraction was decreasing due to a large reduction in hydropower abstracted in Wales. The abstractions for public water supply, which makes up 50% of total abstraction, decreased slightly by 1% over the same period to 5.1 billion cubic metres in 2015<sup>207</sup>.

**Figure 6.1** shows abstraction by type for the years 2000-2015.

Figure 6.1 Estimated abstractions from non-tidal surface water and groundwater in England, 2000 to 2015.



**Source:** Environment Agency

<sup>206</sup> Waterwise (2017) Water efficiency strategy for the UK. Available online at:

<http://www.waterwise.org.uk/data/resources/67/Waterwise-UK-Water-Efficiency-Strategy-full-report.pdf>

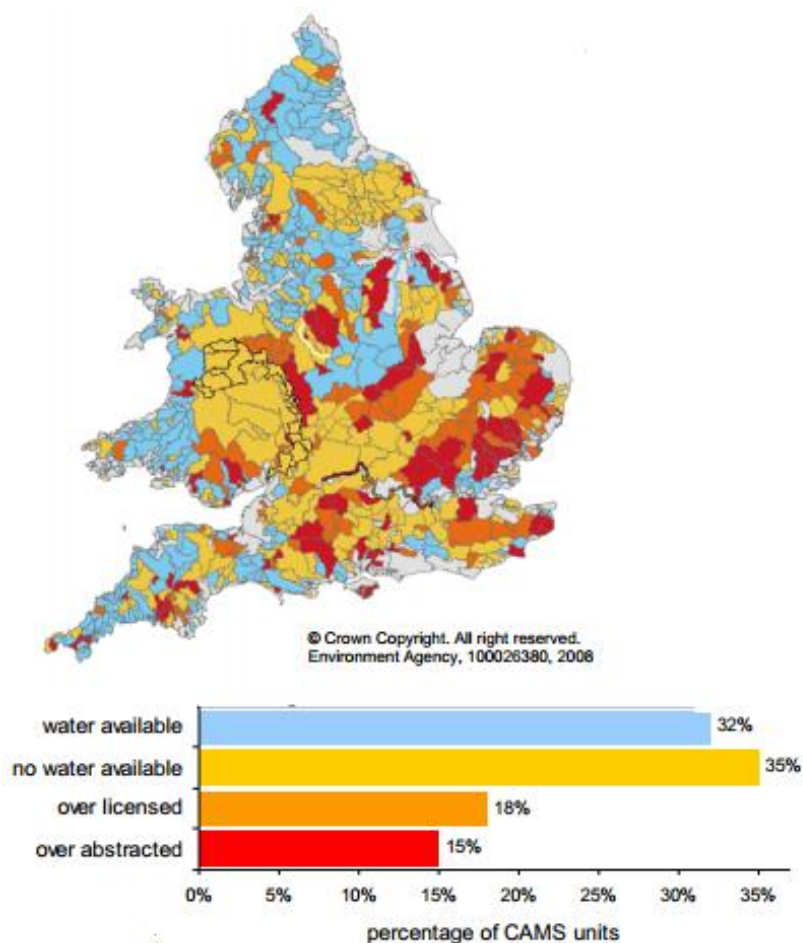
<sup>207</sup> Defra (2017) Water abstraction statistics, England 2000-2015. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/422246/Water\\_Abstractions\\_release\\_V1.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/422246/Water_Abstractions_release_V1.pdf)

## Water Quantity

The results from the first cycle of Catchment Abstraction Management Strategies in 2008 showed that there is considerable pressure on water resources throughout England and Wales but in particular in the South East and East of England, with less pressure in the north west of England and the west of Wales as shown in **Figure 6.2**<sup>208</sup>.

Figure 6.2 Map of Water Available for Abstraction (surface water combined with groundwater)



Source: Environment Agency. Water resources in England and Wales – current state and future pressures. 2008.  
<http://webarchive.nationalarchives.gov.uk/20140328084622/http://cdn.environment-agency.gov.uk/geho1208bpas-e-e.pdf>

## Leakage

**Table 6.1** identifies the leakage data for water companies in England and Wales.

<sup>208</sup> Defra. Environmental Statistics – Key facts. 2013.  
<http://data.defra.gov.uk/env/doc/Environmental%20Statistics%20key%20facts%202012.pdf>

## Water Quantity

Table 6.1 Leakage per property served per day (litres per day)

Company	2011-12	2012-13	2013-14	2014-15	2015-16
<b>Water and Sewerage Companies</b>					
Anglian	93.83	89.14	91.11	89.77	84.47
Dwr Cymru	115.15	127.10	130.89	127.18	126.93
Northumbrian	109.82	114.88	113.22	114.90	113.80
Severn Trent	133.24	126.64	126.64	127.00	122.98
South West	101.31	105.06	105.06	104.31	103.59
Southern	75.63	74.71	78.40	75.21	76.53
Thames	172.26	174.70	174.16	175.60	170.94
United Utilities	139.98	141.21	139.67	139.55	138.01
Wessex	115.48	115.48	115.48	114.57	112.51
Yorkshire	121.64	117.64	125.19	127.15	125.22
<b>Water only companies</b>					
Affinity	116.42	129.93	123.93	125.22	122.64
Bournemouth	106.42	102.35	102.55	101.94	95.44
Bristol	82.67	80.75	84.59	85.99	83.83
Cambridge	91.82	91.60	94.20	98.87	95.86
Dee Valley	68.30	74.39	81.36	77.68	78.24
Essex and Suffolk	74.91	68.37	74.03	76.60	74.54
Hartlepool	94.98	89.06	87.01	91.66	98.97
Portsmouth	119.53	109.84	96.91	92.22	89.03
South East	105.02	102.76	102.10	94.40	89.97
South Staffs	117.70	112.70	115.46	118.23	119.08
Sutton and East Surrey	83.17	83.52	84.33	84.75	84.19

On an industry wide basis, the trend is towards a reduction in leakage, however this masks some notable variation between the companies. For example, Portsmouth has reduced leakage by 30 litres per property served per day, compared to an increase of 12 litres for Dwr Cymru.

### Household Water Use

**Table 6.2** shows the level of water consumption for water companies in England and Wales. As can be seen, the overall industry trend is downwards, with some significant variation between water companies.



## Water Quantity

Table 6.2 Average water use (litres per person per day)

	2011-12	2012-13	2013-14	2014-15	2015-16	Trend
<b>Industry Average</b>	<b>145.8</b>	<b>140.1</b>	<b>141.5</b>	<b>138.6</b>	<b>139.6</b>	
<b>Water and Sewerage Companies</b>						
Anglian*	144.8	136.2	135.1	133.4	135.4	
Dŵr Cymru	152.1	144.4	144.6	141.5	138.5	
Northumbrian	146.2	140.5	141.2	141.9	144.7	
Severn Trent	125.0	120.9	129.3	126.4	130.4	
South West	134.5	136.7	136.9	134.6	136.6	
Southern	156.7	143.4	140.8	134.8	132.0	
Thames	160.6	154.7	156.2	150.9	149.3	
United Utilities	132.0	128.0	129.1	130.0	130.0	
Wessex	139.8	136.3	138.4	138.8	138.1	
Yorkshire	136.0	133.4	136.2	133.0	133.1	
<b>Water only companies</b>						
Affinity	157.6	148.5	154.7	148.3	152.2	
Bournemouth	146.4	142.4	144.1	138.4	133.6	
Bristol	142.0	141.0	144.0	143.0	141.1	
Cambridge	140.7	133.1	130.1	130.5	132.9	
Dee Valley	138.3	135.5	132.9	130.4	134.9	
Essex & Suffolk	153.0	147.4	151.9	151.0	150.7	
Hartlepool	123.7	123.1	124.7	119.9	127.5	
Portsmouth	160.0	149.0	148.0	145.5	143.3	
South East	167.2	159.4	155.6	148.2	161.2	
South Staffs	135.6	127.6	131.0	129.0	128.9	
Sutton & East Surrey	168.6	161.5	166.5	161.1	157.9	
* Anglian includes Hartlepool						

Over the past five years, there has been a downward trend in the amount of water that households are using each day, although fluctuations can be seen throughout the years. However, in 2015-16, there was a slight increase in the amount of water that customers use each day. Only four companies have met the UK Government's aspirational target of 130 litres per person, per day.

## Scotland

In Scotland, before 2006 there were limited forms of control on abstraction and impoundment. Ministers were able to make Water Orders to give powers to water authorities to abstract water for public water supply. Since April 2006, the Water Environment (Controlled Activities) (Scotland) Regulations have taken effect and abstractions and impoundments for water supply now require authorisation by SEPA. It is a condition of authorisation that water should be used efficiently.

Between 2002 and 2009, estimated raw water abstractions by Scottish Water decreased by 13% to 2,165 MI/d. Between 2010 and 2015, using improved data and methodology, the volume of raw water abstracted decreased by 12.6% to 1,831 MI/d. Operational use increased by 53 MI/d between 2002/03 and 2007/08 to a peak of 71 MI/d. It has since decreased by 14 MI/d to 57 MI/d in 2015/16. Reported domestic water consumption has increased by 13 % between 2002/03 and 2015/16, though it should be noted improved data and methodologies have been used in later years. Non-domestic water consumption has decreased by

## Water Quantity

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24% over the same period. When looking at all water consumption combined (operational use, domestic and non-domestic consumption), between 2002/03 and 2015/16 it has remained almost constant.<sup>209</sup>

Water usage statistics for Scotland from 2002/03 to 2015/16 are set out in **Figure 6.3**. Most noticeable is the 53% decline in total leakage in this period. Raw water abstracted, treated water produced and nondomestic consumption have all also declined in the long term. Domestic water consumption has increased by 13% over that time, with 4% of that increase between 2014/15 and 2015/16.

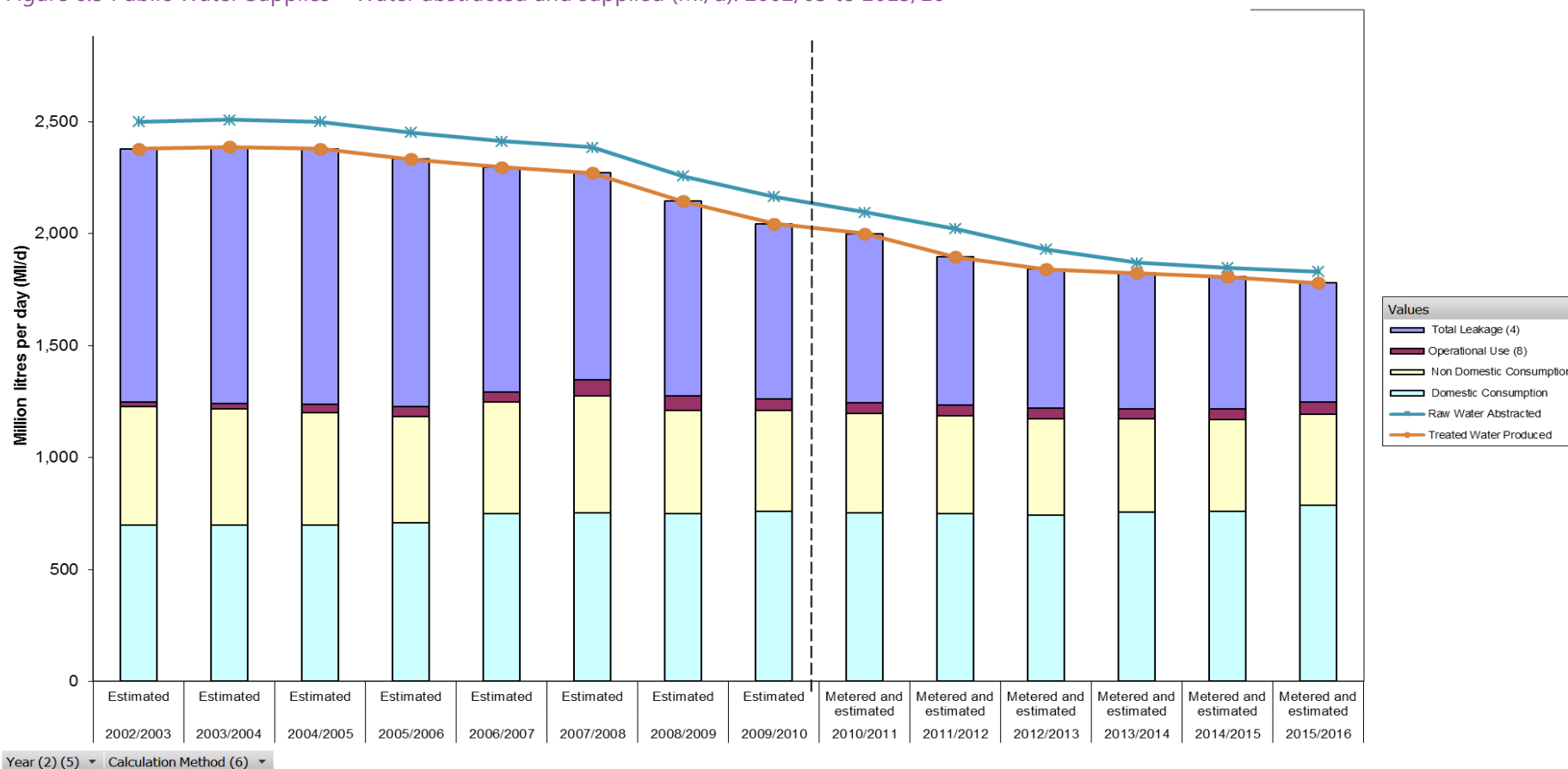
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<sup>209</sup> Scottish Government (2016) *Public Water Supplies – Water abstracted and supplied*. Available online at: <http://www.gov.scot/seso/Datasets.aspx?TID=5>



## Water Quantity

Figure 6.3 Public Water Supplies – Water abstracted and supplied (MI/d): 2002/03 to 2015/16



Source: Scottish Water

## Water Quantity

### Wales

Wales has relatively high rainfall compared to the rest of the UK, receiving on average 1400mm per year. However, this hides the geographical differences across the Welsh Water supply area. Across Anglesey, the borders of Wales and Herefordshire, rainfall is around 700 mm per year<sup>210</sup>, whilst the mountainous areas of the Brecon Beacons and Snowdonia receive substantially more rainfall, with the latter typically receiving more than 3,000mm of rainfall per year<sup>211</sup>.

Rainfall patterns combined with sources of demand drive the nature of the water resource system operated by Welsh Water. Only 3 per cent of the rainfall in Wales is used for public water supply, which is very different to the rest of the UK where up to 50 per cent of rainfall is used to supply.

The number and type of water bodies in Wales is shown in **Table 6.3**.

**Table 6.3** Number and Type of Water Bodies in Wales<sup>212</sup>

Water body category	Heavily modified	Total
<b>River*</b>	164	1153
<b>Lake</b>	91	124
<b>Coastal</b>	5	23
<b>Estuarine</b>	13	32
<b>Groundwater</b>	n/a	39
<b>Total</b>	273	1371

\* River water bodies includes canals and surface water transfers.

The availability of water in wales is shown in **Figure 6.4**.

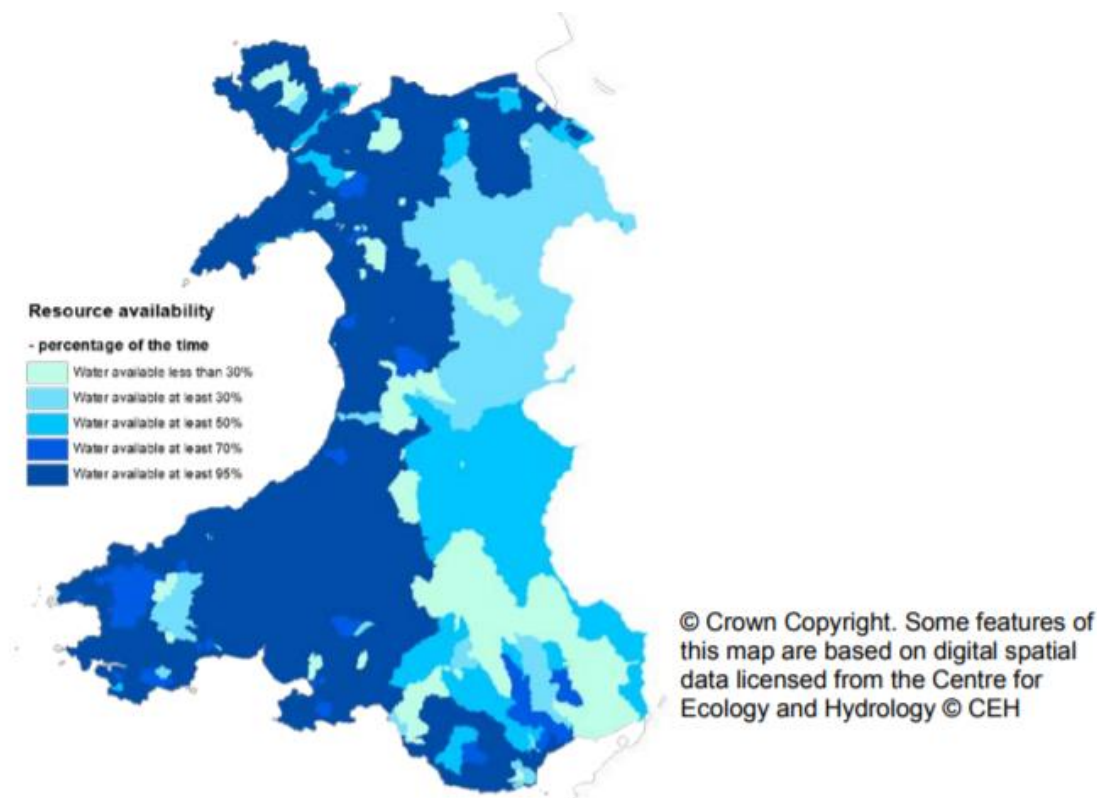
<sup>210</sup> Welsh Water. Final Water Resources Management Plan. Technical Report. April 2014. Available from: <http://www.welshwater.com/en/Environment/Water-Resources/Water-Resource-Management-Plan.aspx>

<sup>211</sup> <http://www.metoffice.gov.uk/climate/uk/regional-climates/wl>

<sup>212</sup> NRW (2017) Water Watch Wales. Available at <http://waterwatchwales.naturalresourceswales.gov.uk/en/>

## Water Quantity

Figure 6.4 Water resource availability in Wales in 2014 (percentage of time)



**Source:** Natural Resources Wales

Water is abstracted from water bodies for many purposes, including public water supply in Wales and England, agriculture, industry and electricity generation. In Wales, most of the water licensed for abstraction is from surface water rather than groundwater, with electricity generation being the sector abstracting the most (82 per cent), followed by public water supply (13 per cent), other industry (0.03 per cent), fish farming and amenity ponds (0.01 per cent). Spray irrigation, other agriculture and private water supplies account for a very low percentage of the total water abstracted<sup>213</sup>. About 60 per cent of water bodies in Wales can provide a reliable source of water for new abstractions for at least 95 per cent of the time. Approximately 10 per cent of water bodies in Wales can only provide water for new abstractions 30 per cent or less of the time (less than 100 days a year)<sup>214</sup>.

Welsh Water manages its water supplies and demands across 24 water resource zones (WRZs). Welsh Water delivers some 850 million litres of drinking water per day to more than 3 million people living in Wales and some adjoining parts of England<sup>215</sup>. Approximately 98 per cent of the water Welsh Water abstracts is taken from rivers and reservoirs, the majority of which is drawn from a total 65 impounding reservoirs. In response to weather, water supply and environmental needs 20 of these reservoirs feed water into five major rivers

- Rivers Wye and Usk in South East Wales;

<sup>213</sup> Environment Agency (2011) *Case for change – current and future water availability*. Available online at <http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/research/planning/135501.aspx>

<sup>214</sup> Environment Agency & NRW (2013) *Current and future water availability – addendum: A refresh of the Case for Change analysis, December 2013*. Available online at: <http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/research/planning/135501.aspx>

<sup>215</sup> Welsh Water. *Final Water Resources Management Plan. Technical Report. April 2014*. Available online at: <http://www.welshwater.com/en/Environment/Water-Resources/Water-Resource-Management-Plan.aspx>

## Water Quantity

- Rivers Tywi and Eastern Cleddau in South West Wales; and
- the River Dee in North Wales<sup>216</sup>

River abstractions are most prevalent in Tywyn Aberdyfi, Llyswen, Hereford CU, Whitbourne, Ross on Wye, and Monmouth zones. Reservoir supplies dominate the rest of Welsh Water's company area. The remaining 2 per cent of water is drawn from the ground through springs, wells and boreholes. There are groundwater sources in the Pilleth, Brecon/Portis, Clwyd Coastal, and Vowchurch zones.

Some of the water used to supply densely populated areas is taken from water bodies in statutory designated protected areas. Changes to hydraulic conditions are identified as having an impact or likely to have an impact on 45 of 112 (40%) Natura 2000 protected sites. Reduced flows caused by abstraction present risks to migratory fish and wider biodiversity. Water Framework Directive (WFD) investigations have identified 29 (3%) water bodies that have failed to meet objectives because of changes to flows and water levels<sup>217</sup>.

## 6.4 Summary of Existing Problems Relevant to the Water Resources NPS

The following existing problems for water quality have been identified:

- There has been a downward trend in the amount of water that households are using each day (decreasing from 145.8 litres per person per day (lppd) in 2011/12 to 139.6 lppd in 2015/16). However, many water companies have forecast an increase in per capita consumption in their WRMPs. As such, there is an ongoing need to promote water efficiency measures (including metering).
- Average actual leakage levels (mega litres per day) have remained broadly level for the last five years and further opportunities exist to reduce leakage rates including using a variety of innovative measures.
- Demand for water is expected to increase from a growing population alongside industrial, agricultural and commercial pressures. Water resources in parts of the UK, particularly the south east and east of England are under growing pressure.
- The risk of prolonged and more severe droughts is increasing, which in turn risks the increasing use of drought restrictions measures and consequent effects on the environment, people and the economy.
- Climate change is expected to have significant impacts on the water environment. Areas where the underlying geology is generally impermeable are expected to be particularly affected as river flows would be likely to fall to low levels in drier periods and quickly react to rainfall episodes.
- There are legislative requirements to reduce abstraction.

<sup>216</sup> Welsh Water. Final Water Resources Management Plan. Technical Report. April 2014. Available online at: <http://www.welshwater.com/en/Environment/Water-Resources/Water-Resource-Management-Plan.aspx>

<sup>217</sup> Natural Resources Wales (2016) *The State of Natural Resources Report (SoNaRR): Assessment of the Sustainable Management of Natural Resources*. Available online at: <https://naturalresources.wales/media/681127/chapter-3-state-and-trends-final-for-publication.pdf>

## Water Quantity

- There is a need to ensure that there is sufficient water infrastructure in place to accommodate future growth in the UK.

## 6.5 Likely Evolution of the Baseline

### UK

The UK Climate Change Risk Assessment<sup>218</sup> indicates that rainfall patterns will become increasingly seasonal, with lower amounts of flow in the summer. This will lead to lower summer river flows, especially in those catchments with a low groundwater component. This could lead to increased abstraction pressure and increased stress on sensitive hydrological systems. Population pressures are predicted to increase in certain parts of Great Britain, for example in the South East<sup>219</sup>. Increased population density will result in an increased pressure on natural resources and could exacerbate current problems or cause new ones. Economic growth could also lead to increased commercial, industrial and agricultural pressure on water resources<sup>220</sup>.

It is anticipated that climate change will affect river flows, and in turn the availability of water, in the following ways:

- increases in average winter flows;
- reduced summer flows;
- reduced spring flows;
- no clear pattern in autumn flows; and
- increases in the magnitude of flood events.

These projected changes imply that both high and low flows are likely to be significantly modified throughout the UK. In particular, the reduced summer flows along with an increased demand for water, including water for agriculture, is expected to lead to reduced water availability over the summer months. It is also considered that the UK will experience longer, more acute droughts with areas such as the south and east of England expected to face droughts more severe than those previously experienced<sup>221</sup>.

<sup>218</sup> UK CCC ASC. UK Climate Change Risk Assessment 2017: CCRA2 Evidence Report. 2016. Available online at:

<https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/>

<sup>219</sup> ONS (2016) Subnational Population Projections for Local Authorities in England: Table 2. Available online at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/localauthoritiesinenglandtable2>

<sup>220</sup> Anglian Water, United Utilities and Yorkshire Water. *Water 2020 – Long term challenges and uncertainties for the water sector of the future*. Available online at:

[http://www.anglianwater.co.uk/assets/media/Water\\_2020\\_LT\\_Challenges\\_-\\_Final.pdf](http://www.anglianwater.co.uk/assets/media/Water_2020_LT_Challenges_-_Final.pdf)

<sup>221</sup> Water UK (2016) *Water resources long term planning framework (2015-2065)*. Available online at:

<http://www.preventionweb.net/publications/view/50354>

## Water Quantity

### England and Wales

In 2013, the Environment Agency<sup>222</sup> modelled four potential future demand scenarios for England and Wales based on differing assumed patterns of behaviour. Under all four scenarios the water exploitation index<sup>223</sup> showed how for all parts of England and Wales, demand for water was expected to increase in all four scenarios. The lowest increase in pressure was in Wales, which ranged from a 2.4% to a 3.6% increase. The highest increase was in the south east and east midlands areas of England, which ranged from a 22.7% to 35.9% increase.

The level of stress was identified for each water company area as shown in **Table 6.4**.

Table 6.4 Water company stress classification showing how the current future and future scenarios have been combined.

Water Company Area	2013 Classification					Final Stress
	Current Stress	Future Scenario 1	Future Scenario 2	Future Scenario 3	Future Scenario 4	
Affinity Water (formerly Veolia Water Central)	S	S	S	S	S	Serious
Affinity Water (formerly Veolia Water East)	S	S	S	S	S	Serious
Affinity Water (formerly Veolia Water South East)	S	S	S	S	S	Serious
Anglian Water	S	S	S	S	S	Serious
Bristol Water	M	M	M	M	M	Not Serious
Cambridge Water	M	M	M	M	M	Not Serious
Cholderton & District Water	M	M	M	M	M	Not Serious
Dee Valley Water	M	M	M	M	M	Not Serious
Dwr Cymru Welsh Water	M	M	M	M	M	Not Serious
Essex & Suffolk Water	S	S	S	S	S	Serious
Northumbrian Water	M	M	M	M	M	Not Serious
Portsmouth Water	M	S	M	S	M	Not Serious
Sembcorp Bournemouth Water	L	M	M	M	L	Not Serious
Severn Trent Water	M	M	M	M	M	Not Serious
South East Water	S	S	S	S	S	Serious
South Staffordshire Water	M	M	M	M	M	Not Serious
South West Water	M	M	M	M	M	Not Serious
Southern Water	S	S	S	S	S	Serious
Sutton & East Surrey Water	S	S	S	S	S	Serious
Thames Water	S	S	S	S	S	Serious
United Utilities	M	M	M	M	M	Not Serious
Veolia Water Projects	M	M	M	M	M	Not Serious
Wessex Water	M	M	M	M	M	Not Serious
Yorkshire Water	M	M	M	M	M	Not Serious

Source: Environment Agency

In May 2016, PwC and Yorkshire Water<sup>224</sup> published a review of the water sector including six future scenarios that provide six different views of the overall direction for the water environment. Its conclusions include that there is the potential for extending the life of water wholesale assets using a combination of digital technology, microbiology and nanotechnology as doing more with less will be important given the need to

<sup>222</sup> Environment Agency (2013) *The case for change - current and future water availability*. Available online at:

<http://webarchive.nationalarchives.gov.uk/20140328154328/http://cdn.environment-agency.gov.uk/geho1111bvpe-e-e.pdf>

<sup>223</sup> The water exploitation index (WEI) in a country is the mean annual total demand for freshwater divided by the long-term average freshwater resources. It gives an indication of how the total water demand puts pressure on the water resource. It also identifies those countries that have high demand in relation to their resources and therefore are prone to suffer problems of water stress.

<sup>224</sup> PwC and Yorkshire Water (2016) *The water and wastewater sectors*. Available online at:

<https://www.yorkshirewater.com/sites/default/files/The%20Water%20and%20Wastewater%20Sectors%20-%20The%20Long%20View.pdf>

## Water Quantity

build resilience and achieve good ecological status. It also concludes that the upward pressure on customers' bills is likely to continue, with the bulk of the work to achieve good ecological status likely to fall within the third cycle of the Water Framework Directive (2021-2028). Companies will also need to improve resilience to climate change which is likely to involve strategic investment.

### England

The Environment Agency's Catchment Abstraction Management Strategies (CAMS) have identified a number of catchments in England which are designated as Over-Licensed or Over-Abstracted. Climate change is likely to result in lower summer rainfalls and more frequent/severe winter flood events. Such changes are likely to increase pressure on summer freshwater water availability and increase pollutant run-off into controlled waters during flood events. Unsustainable groundwater and surface water abstraction may contribute to environmental damage of rivers and wetlands at 500 sites in England and Wales, important conservation sites, including sites of national and international conservation importance. However, it should be noted that the Environment Agency's approach to abstraction management and the restrictions placed on abstraction by the Water Framework Directive would both be expected to act in mitigation of these potential trends.

Defra's *Creating a Space for Living*<sup>225</sup> identifies that by the 2050s, summer temperatures are likely to increase while summer rainfall decreases, leading to increased risks of short-duration droughts. The population in England is forecast to grow by over 10 million people over the same period, with a large part of this growth occurring in areas where water is already scarce. While demand management will have an important role, significant new water resources will be needed to meet the needs of people, businesses and the environment. The changing climate and growing population are also putting pressure on the sewerage network. Population growth and new development increase the flows entering the network. More intense rainfall can overwhelm the wastewater system and cause sewer flooding and environmental pollution.

Water Resources Planning Guidance<sup>226</sup> sets out the Government's expectations for water companies, requiring their WRMPs to be aimed at providing secure, sustainable and affordable supplies of water to customers. This includes taking better account of the value of water by reflecting its scarcity and the environmental and social costs of abstraction in order to make the water sector's activities more sustainable. It expects water companies to meet Ofwat's challenge of reducing leakage by 15% by 2025 and to explore the use of innovative approaches to achieve leakage reductions in line with leading companies.

This is further reinforced through the Guiding Principles for Water Resources Planning<sup>227</sup> which explains the key policy priorities the government expects water resources management plans (WRMP) to address. This includes thorough testing of vulnerability of water supply systems taking into account reasonably predictable events. Plans need to show that they have considered a broad range of options including options to manage plausible droughts more severe than the WRMP has been designed to cope with. The options chosen are required to show the environmental and social costs and benefits including carbon costing, the value of natural assets, and customer support, with evidence about preferences and willingness to pay.

<sup>225</sup> Defra (2016) *Creating a great place for living: enabling resilience in the water sector*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/504681/resilience-water-sector.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/504681/resilience-water-sector.pdf)

<sup>226</sup> Environment Agency and Natural Resources Wales (2018) *Water Resources Planning Guideline: Interim Update*. Available from:

<https://cdn.naturalresources.wales/media/686174/interim-wrpg-update-july18-final-changes-highlighted.pdf>

<sup>227</sup> Defra (2016) *Guiding principles for water resources planning*. Available online at:

<https://corporate.thameswater.co.uk/About-us/Our-strategies-and-plans/Water-resources/Document-library/-/media/5586F2E64E994C8182897B097A292618.ashx?bc=White&db=web&la=en&thn=1&ts=cc20fdf6-3d41-4ebb-a3ea-e9e6de0382e1.pdf>



## Water Quantity

Both of these water resource planning documents identify that where an increase in population or commercial use leads to increases in total demand, the company must ensure that its plan demonstrates a decrease in per capita consumption.

### Scotland

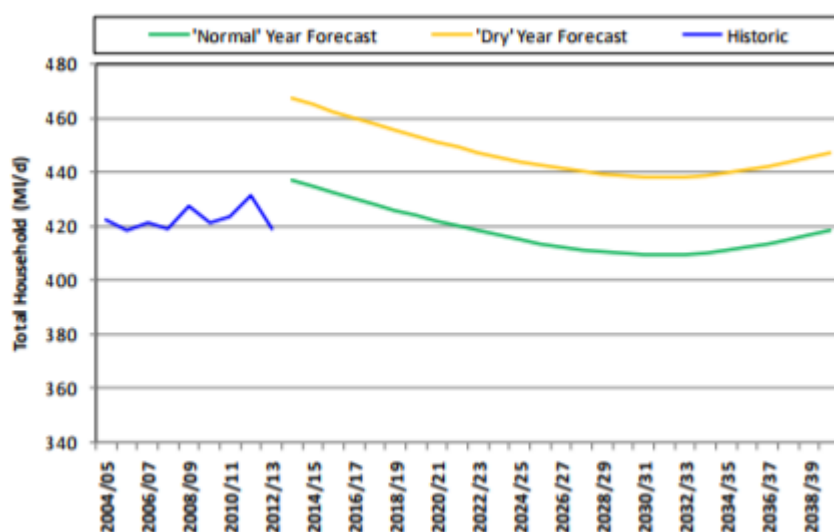
Climate change is likely to bring uncertainty and, with a projected decrease in summer rainfall, may exert pressure in areas that have not yet experienced water scarcity.

Climate change may also reduce the ability of the water environment to safely absorb and break down pollutants. In addition, the likelihood of reduced summer rainfall may mean less water for diluting pollutants. Conversely, expected higher annual river flows at certain times of the year may help dilute pollutant discharges to rivers. Consequently, the quantity of pollutants reaching the sea without first having been broken down in rivers may increase. Groundwater is also a valuable resource in Scotland providing water to households and small businesses and maintaining base river flows in summer months. Groundwater recharge is vulnerable to drier summer conditions<sup>228</sup>.

### Wales

Figure 6.5 shows Welsh Water's<sup>229</sup> predicted future water demand scenarios.

Figure 6.5 Welsh Water Historic and Future Household Demand



Population increase estimates are lower for Wales than for many other parts of the UK. However, the percentage of households metered across Wales is also lower than most other parts of the UK, save for the North East. Overall, household demand for water in Wales is expected to increase from approximately 2030.

Climate change is expected to have significant effects on river flows in Wales, with most major watercourses experiencing 10-15% increase in mean monthly winter flows and 50-80% decreases in summer flows. These

<sup>228</sup> Scottish Government (2013) *Climate Ready Scotland: Strategic Environmental Assessment*. Available online at: <http://www.gov.scot/Resource/0042/00426535.pdf>

<sup>229</sup> Welsh Water (2014) *Final water resources management plan: Technical report*. Available online at: <http://www.dwr.cymru.com/en/Environment/Water-Resources/Water-Resource-Management-Plan.aspx>



## Water Quantity

predictions are generally more pronounced than in England, primarily due to the lack of groundwater storage capacity in Wales.

Climate change may affect groundwater recharge. By 2025 it is likely that groundwater recharge will decrease, resulting in decreased dry weather river flows and a general lowering of groundwater levels. This may have impacts on base-flow to rivers and wetlands in dry periods and affects small domestic and agricultural water supplies<sup>230</sup>.

## 6.6 Assessing Significance

The objectives and guide questions related to water quality and resources which have been identified for use in the appraisal of the effects of Water Resources NPS proposals are set out in **Table 6.5**, together with reasons for their selection.

**Table 6.5 Approach to Assessing the Effects of the Water Resources NPS Proposals on Water Quantity**

Objective/Guide Question	Reasoning
<b>Objective: To protect and enhance surface and ground water levels and flows and ensure sustainable water resource management.</b>	The SEA Directive (2001/42/EC) requires that likely significant effects on water be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report. The Water Framework Directive (2000/60/EC) encourages the sustainable use of water resources.  Demand for water is expected to increase from a growing population alongside industrial, agricultural and commercial pressures. There is growing pressure on water resources in parts of the UK, particularly the south east and east of England. The inclusion of this AoS objective ensures that these effects can be considered within the AoS.
Will the Water Resources NPS affect river flows and groundwater levels?	Abstraction of water from non-tidal surface water and groundwater in England and Wales had fallen steadily from a peak in 2001 to 8.2 billion cubic metres in 2011. However, since 2011, total abstraction has increased by 14%. The results from the first cycle of Catchment Abstraction Management Strategies in 2008 showed that there is considerable pressure on water resources throughout England and Wales but in particular in the South East and East of England. Climate change is likely to result in lower summer rainfalls and more frequent/severe winter flood events. Such changes are likely to increase pressure on summer freshwater water availability and increase pollutant run-off into controlled waters during flood events. Unsustainable groundwater and surface water abstraction may contribute to environmental damage of rivers and wetlands.
Will the NPS reduce the impact of drought measures on the environment?	In times of drought the flow rates on rivers can be reduced to ensure sufficient water supply for human consumption, which can adversely affect the environment water quality and biodiversity.
Will the Water Resources NPS affect demand for water resources?	The Water Framework Directive (2000/60/EC) encourages the sustainable use of water resources. Government strategies including Water for people and the environment - Water resources strategy for England and Wales (2009) and Water for Life (2011) promote the sustainable use of water. Some parts of the UK have abstraction above a sustainable level which could result in water shortages in some areas in the future.
Will the Water Resources NPS ensure the	The Water Framework Directive (2000/60/EC) encourages the sustainable use of water

<sup>230</sup> Natural Resources Wales (2016) *The State of Natural Resources Report (SoNaRR): Assessment of the Sustainable Management of Natural Resources*. Available online at: <https://naturalresources.wales/media/681127/chapter-3-state-and-trends-final-for-publication.pdf>

## Water Quantity

Objective/Guide Question	Reasoning
sustainable and resilient supply of water resources?	resources. The Environment Agency's 2011 'Case for Change' considered the implications of climate change for water supplies regionally and nationally and concluded that while demand management will have an important role, significant new water resources will be needed to meet future needs. Water UK's 2016 'Water resources long term planning framework (2015-2065)' noted the importance of strategic schemes to provide future resilience. The Government confirmed in its 'Consultation on the Government's Strategic Priorities for Ofwat: Affordable, Resilient Water Supplies' (2017) that a strategic objective for Ofwat is to further a reduction in the long-term risk to water supply resilience from drought and other factors, through a range of measures including new supply solutions.
Will the Water Resources NPS affect hydrological functioning such as flow variation?	Climate change and changes to abstraction can affect factors such as flow variability, which in turn can effect both water abstractors and ecosystems.

**Table 6.6** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the population objective.

**Table 6.6** Illustrative Guidance for the Assessment of Significance for Water Quantity

Effect	Description	Illustrative Guidance
++	Significant Positive	<ul style="list-style-type: none"> <li>Option would lead to a major increase in water supply/availability such that the risk of water shortages in an area is significantly decreased and abstraction is at a sustainable level in the long term;</li> <li>Option would lead to a major reduction in water use compared to prior to development such that the risk of water shortages in an area is significantly decreased and abstraction is at a sustainable level in the long term;</li> <li>Option would lead to a major reduction in the risk and/or severity of droughts.</li> </ul>
+	Positive	<ul style="list-style-type: none"> <li>Option would lead to a minor increase in water supply/availability such that the risk of water shortages in an area is decreased and abstraction is at a sustainable level in the long term;</li> <li>Option would lead to a minor reduction in water use compared to prior to development such that the risk of water shortages in an area is decreased in the short term and abstraction is closer to sustainable levels than prior to development;</li> <li>Option would lead to a minor reduction in the risk and/or severity of droughts.</li> </ul>
0	Neutral	<ul style="list-style-type: none"> <li>Option would not significantly affect water demand and abstraction levels would not be altered;</li> </ul>
-	Negative	<ul style="list-style-type: none"> <li>Option would lead to a minor reduction in water supply/availability such that the risk of water shortages in an area is increased;</li> <li>Option would lead to a minor increase in water use compared to prior to development such that the risk of water shortages in an area is increased to some level in the short term, particularly in periods of low flow, and abstraction is considered beyond sustainable levels;</li> <li>Option would lead to a minor increase in the risk and/or severity of droughts.</li> </ul>
--	Significant Negative	<ul style="list-style-type: none"> <li>Option would lead to a major reduction in water supply/availability such that the risk of water shortages in an area is significantly increased and abstraction is not at a sustainable</li> </ul>

## Water Quantity

Effect	Description	Illustrative Guidance
		<p>level in the long term;</p> <ul style="list-style-type: none"> <li>Option would lead to major increases in water use compared to prior to development such that the risk of water shortages in an area is significantly increased and abstraction is significantly beyond sustainable levels;</li> <li>Option would lead to an exceedance of an abstraction license limit;</li> <li>Option would lead to a major increase in the risk and/or severity of droughts.</li> </ul>
?	Uncertain	<ul style="list-style-type: none"> <li>From the level of information available, the effect that the option would have on this objective is uncertain.</li> </ul>

## Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 6.7** presents the appraisal of the likely significant effects of the draft NPS and the and the 'no NPS' reasonable alternative on the water quantity objective. The appraisal considers in-turn the three sub-sections used for each topic within Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making and Mitigation. The performance of the draft NPS and the and the 'no NPS' reasonable alternative are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters 1 – 3 of the draft NPS outlining how the remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the two reasonable alternatives is then summarised along with any proposed mitigation measures.

## Water Quantity

Table 6.7 Appraisal of the Draft NPS and Reasonable Alternatives: Water Quantity\*

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	+	+/?	<p><b>Draft NPS:</b> The text in the draft NPS under the heading of 'Applicant's Assessment' states:</p> <p>4.15.6 "The applicant should make early contact with the relevant regulators, including the local authority, the EA and MMO where appropriate,, for relevant licensing and environmental permitting requirements. Where the proposed development is likely to have adverse effects on the water environment, the applicant should undertake an assessment of the existing status and impacts of the proposed development on water quality, water resources and physical characteristics as part of the Environmental Statement. A project specific WFD assessment may also be required."</p> <p>General guidance on the likely contents that should form part of the Environmental Statement (ES) is provided in para 4.15.7:</p> <ul style="list-style-type: none"> <li>• "the existing quality of waters affected by the proposed project;</li> <li>• existing water resources affected by the proposed project and the impacts of the proposed project on water resources;</li> <li>• existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project, and any impact of physical modifications to these characteristics;</li> <li>• any impacts of the proposed project on water bodies or protected areas under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 including groundwater resources, bathing or coastal waters;</li> <li>• the likely range of impacts on existing water quality, resources, physical characteristics of the water environment and waterbodies or protected areas due to climate change, and</li> <li>• any cumulative effects."</li> </ul> <p>The requirement for early engagement with the relevant regulators, provision of guidance in terms of an ES (and where relevant a Water Framework Directive (WFD) Assessment) and identification of mitigation measures will help to ensure that the likely effects of the construction and operation of water resources infrastructure on water quantity are properly considered.</p> <p>Overall, the draft NPS has been assessed as having a positive effect on this AoS objective.</p> <p><u>Recommendations for Improvement</u></p>

## Water Quantity

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>It is noted that this section of the draft NPS gives more focus to impacts on water quality. Consideration could be given to providing further advice and guidance for applicants in respect of water quantity and water resource availability (for example, with reference to Catchment Abstraction Management Strategies).</p> <p>Consideration could be given to the provision of the following additional guidance on the contents of the ES, which in turn serves as the reference point for the detail of the 'Decision Making' section:</p> <ul style="list-style-type: none"> <li>• Scoping <ul style="list-style-type: none"> <li>○ Identify the likely zone of influence of the proposed development.</li> <li>○ Describe the surface water and groundwater environment in the study area likely to be affected;</li> <li>○ Describe any future anticipated changes to surface water and groundwater resources in the absence of the proposed scheme, to inform the assessment of impacts;</li> <li>○ Provide the basis for determining significance of effects arising from the impacts.</li> </ul> </li> <li>• Impact assessment <ul style="list-style-type: none"> <li>○ Identify the potential impacts on water quantity including and characterise these impacts and their effects (including scale, duration and significance);</li> <li>○ Consider the findings and recommendations of any WFD Assessment prepared in support of the relevant WRMP and project;</li> <li>○ Assess the potential effects on aquatic ecology and habitats including a cross-reference to Section 4.3 of the draft NPS;</li> <li>○ Assess the residual impacts of the scheme remaining after mitigation and the significance of their effects, including cumulative effects.</li> </ul> </li> <li>• Avoidance, mitigation, compensation and enhancement <ul style="list-style-type: none"> <li>○ Identify and incorporate measures to avoid, reduce and compensate impacts on water quantity, including opportunities to enhance the water environment;</li> <li>○ Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.</li> </ul> </li> </ul>

## Water Quantity

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of extant national planning policy and the EIA Regulations which require consideration of the effects of development proposals on water quantity. The abstraction licensing regime would also apply and proposals would continue to be identified through the WRMP process which would include the consideration of effects on water quantity and availability. In consequence, even without the NPS, this alternative would still be considered to have a positive effect in relation to water quantity. However, the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level.</p>
Decision Making	+	+/?	<p><b>Draft NPS:</b> The draft NPS states in the 'Decision Making' section that:</p> <p>4.15.11 <i>"The Secretary of State will need to give impacts on the water environment more weight where a development would have adverse effects on the achievement of the environmental objectives established under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017."</i></p> <p>The text goes on to state at para 4.15.12 that <i>"The Secretary of State should be satisfied that a proposal has had regard to the River Basin Management Plans and the requirements of the WFD, including Article 4.7, and those on priority substances and groundwater. The specific objectives for particular river basins are set out in River Basin Management Plans"</i></p> <p>At para 4.15.13, the draft NPS emphasises the need for the Secretary of State to consider mitigation measures proposed by the applicant and whether appropriate requirements should be attached to any development consent and/or whether planning obligations are necessary.</p> <p>In stating that the Secretary of State will need to give due consideration to impacts on the water environment in the context of the WFD and RBMPs, and taking into account the provisions relating to mitigation/planning obligations, the draft NPS has been assessed as having a positive effect on water quantity.</p> <p><u>Recommendations for Improvement</u></p> <p>It is considered that the guidance provided in this section of the draft NPS could be more definitive in respect of the circumstances in which the Secretary of State would refuse consent due to unacceptable impacts on water quantity. In addition, this section could include reference to opportunities to enhance the quality of the water environment.</p> <p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of extant national planning policy and the EIA Regulations and would be informed by the WRMP options identification and appraisal process. The abstraction licensing</p>

## Water Quantity

Draft NPS Section	Draft NPS	No NPS	Appraisal
			regime would also continue to apply. This is expected to help ensure that water quantity is not compromised by water resources infrastructure development, generating a positive effect on this AoS objective. However, the absence of a clear statement regarding the full range of considerations to be taken into account by the Secretary of State (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level.
Mitigation	+/?	+/?	<p><b>Draft NPS:</b> In the 'Mitigation' section, the draft NPS states:</p> <p>4.15.14 <i>"The Secretary of State will need to consider whether the mitigation or enhancement measures put forward by the applicant which are needed for operation and construction are acceptable."</i></p> <p>The introductory text to the topic considers the potential impacts of water resources infrastructure on water quality and related mitigation measures, stating in para 4.15.3 that <i>"The WRMP options appraisal process is subject to WFD assessment and information from this process may be useful for any project specific WFD assessment. The WRMP options appraisal process considers the wider availability of water supplies, so that projects have been assessed in terms of the quantity of water available for public supply and its impact on water availability for the local environment. This section therefore focuses on local water quality aspects."</i></p> <p>Whilst the draft NPS sets out the impacts of development and associated mitigation in respect of water quality, it is considered that (as currently worded) the draft NPS lacks similar specificity in terms water quantity. Overall, the draft NPS has been assessed as having a positive effect on this AoS objective at this stage, although some uncertainty remains.</p> <p><u>Recommendations for Improvement</u></p> <p>The mitigation (and introduction) section could be revised to provide more explicit guidance in terms of the impacts of nationally significant water resources infrastructure on water resource availability and water quantity. In this context, and to inform the appraisal of section 4.15 of the draft NPS, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on water quantity has been undertaken. This review is intended to help identify where any additional measures could be included in the draft NPS (in the introduction or mitigation section of the topic) to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p> <p>The following text identifies the anticipated water quantity impacts and associated mitigation measures. Where impacts discussed here have not been included within the draft NPS, they have been clearly identified.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p>

## Water Quantity

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><i>Construction</i></p> <p>As identified in the draft NPS, reservoir construction may have temporary impacts on water flows, particularly in respect of the construction of new impoundment reservoirs.</p> <p><i>Operation</i></p> <p>Once operational, a new or enlarged reservoir would play a key role in providing a sustainable and resilient supply of water resources. However, as noted in respect of water quality, surface and groundwater levels can be significantly impacted by the presence of the reservoir. There may be long term changes to river morphology and the hydrological regime of watercourses, including flow reduction resulting from abstraction. This may also affect the status of existing water bodies and result in their re-designation.</p> <p><b>Water Transfer Schemes</b></p> <p><i>Construction</i></p> <p>In addition to the impacts identified in the draft NPS, the construction of water transfer schemes could temporarily disrupt the hydrological regime of existing watercourses. This has the potential to impact downstream sites and end users.</p> <p><i>Operation</i></p> <p>In addition to the impacts identified in the draft NPS, once operational, water transfer schemes would play a key role in providing a sustainable and resilient supply of water resources. The operation of water transfer schemes can have long term impacts on the hydrological regime and hydromorphology of the source and receiving waterbodies; effects in this regard may be positive (the transfer of water could increase water in the receiving system) or negative (due to reduced flows in the donor waterbody).</p> <p><b>Desalination</b></p> <p><i>Construction</i></p> <p>In addition to the impacts identified in the draft NPS, construction of desalination plants could temporarily disrupt the hydrological regime of existing watercourses. This has the potential to impact downstream sites and end users.</p> <p><i>Operation</i></p>



## Water Quantity

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>In addition to impacts identified in the draft NPS, once operational, a desalination plant would play a key role in providing a sustainable and resilient supply of water resources and could help to reduce abstractions from surface water bodies and ground waters that are not sustainable.</p> <p><b>Potential additional mitigation measures identified through a review draft WRMPs and their associated SEA Environmental Reports include:</b></p> <ul style="list-style-type: none"> <li>Careful consideration should be given to the establishment of a compensation flow regime in respect of reservoir development.</li> <li>Detailed modelling of hydrological changes and analysis of effects should be undertaken.</li> <li>Consideration should be given to the findings and recommendations of any WFD Assessment prepared in support of the relevant WRMP. Where necessary, a WFD Assessment for the proposed development should be undertaken.</li> </ul> <p><b>No NPS:</b> In the absence of a NPS, it is expected that appropriate mitigation measures would, in the first instance, be identified as part of the WRMP process and, subsequently, be considered by the competent authority in light of the proposals submitted. As such, mitigation measures would be applied but there is the risk that this is open to interpretation and thereby does not fully address an appropriate range of activities which are directly related to the scheme.</p> <p>Overall, even without the NPS, this alternative would still be considered to have a positive effect in relation to this AoS objective, although a degree of uncertainty persists.</p>
<b>Other Sections of the Draft NPS Relevant to Water Quantity</b>	<p>The following provides additional commentary on the text in the other sections of the draft NPS relevant to water quantity. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b><u>1 Introduction</u></b></p> <p><b>1.1. Background and scope of this NPS</b> - With regards to para 1.1.8, there is an opportunity for the consideration of effects on water quantity in a specific locality through the preparation of a local impact report submitted by a local authority in accordance with the Planning Act. There is no prescribed format for local impact reports but there is clearly an opportunity for a local authority to comment on water quantity as an issue, helping to ensure that consideration is given to likely effects in a particular locality.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on water quantity in Scotland, Wales and Northern Ireland.</p>		

## Water Quantity

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>1.3. Infrastructure covered by the Water Resources NPS</b> – as part of the options identification and appraisal process (including WFD Assessment, HRA and SEA undertaken in support of WRMPs) early consideration will be given to the impacts of options on water quantity.</p> <p><b>1.7. Habitats considerations</b> –the application of the HRA to the draft NPS will help ensure that the interests of European designated nature conservation sites are given proper consideration (including in respect of water quantity impacts), notwithstanding the fact that there remains uncertainty over potential impacts, particularly in respect of the absence of specific locations and likely effects within the draft NPS.</p> <p><b><u>2. Government policy and the need for water resources infrastructure</u></b></p> <p><b>2.2. Pressure on water availability now and in the future</b> – this section makes specific reference to protecting and enhancing the environment as a key driver of the need for nationally significant water resources infrastructure. With specific regard to water quantity (and quality), the draft NPS states “</p> <p>2.2.11 <i>“The UK is home to globally important wetlands, rivers and chalk streams, the healthy existence of which depends on water availability. Having the right flow in our rivers and protecting groundwater levels is essential to supporting healthy ecology and enhancing natural resilience to drought. The impacts of climate change and the growing demand for water is putting added pressure on this availability.”</i></p> <p>2.2.12 <i>“The abstraction of water from the environment can alter the natural flow regime. Current levels of water abstraction from some sources will need to be reduced to protect the environment and help sustain important heritage assets, in line with the Water Abstraction Plan and River Basin Management Plans. In ‘A Green Future’, the government set out its commitment to reduce damaging abstraction of water from rivers and groundwater, while maintaining and improving water supply resilience now and in the future. The challenge in delivering this will increase in the future due to the impacts of climate change and population growth.”</i></p> <p><b>2.5. The role of water resource management plans in identifying the need</b> – as noted, as part of the options identification and appraisal process (including WFD Assessment) undertaken in support of WRMPs, early consideration will be given to the impacts of options on water quantity.</p> <p><b>2.6 The role of nationally significant infrastructure projects</b> – the section identifies that alongside reservoirs, water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP, when assessed against the relevant threshold in the Planning Act 2008 or through a section 35 referral. These infrastructure types may have water quantity impacts of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p> <p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p><b><u>3. Assessment Principles</u></b></p> <p><b>3.1 General principles of assessment</b> - the provisions of the Planning Act 2008 and the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, provides the starting point for consideration of water quantity issues.</p>

## Water Quantity

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including WFD Assessment) undertaken in support of WRMPs, early consideration will be given to the impacts of options on water quantity.</p> <p><b>3.2 Environmental Impact Assessment</b>– the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that impacts on water quantity are fully considered, as will the consideration of cumulative effects and interrelationships between effects. This section specifically states that information gathered from the WRMP options appraisal assessments including WFD Assessment will be useful to identify the significant effects of a proposed project.</p> <p><b>3.3 Habitats Regulations Assessment</b> – requirements in relation to the Habitats Directive may help to protect water bodies where they are related to water-dependent Natura 2000 sites.</p> <p><b>3.4. Environmental Net Gain</b>- consideration of opportunities for environmental net gain during the WRMP options appraisal process and in the detailed design of schemes will help to ensure protection and (where possible) enhancement of water resources. It is noted that this section advises that water companies consider using natural capital accounting and ecosystem services assessments to inform planning and underpin environmental improvements and that <i>"Applications for development consent must be accompanied by a statement demonstrating how opportunities for environmental net gain have been incorporated into the detailed design (including any relevant operational aspects) of the project"</i>.</p> <p><b>3.5 Assessing Alternatives</b> – the identification that reasonable alternatives will be required as part of scheme design and project planning should ensure that impacts on water quantity/availability are taken into account, both in terms of protection and opportunities for mitigation and enhancement.</p> <p><b>3.6 Criteria for 'good design' for water resources infrastructure</b> – the requirement for applicants to include design as an integral consideration from the outset of a proposal is expected to help ensure that measures are adopted to minimise the use of resources including water.</p> <p><b>3.7 Climate Change Adaptation</b> – ensuring that development is adaptable to the effects of climate change will in-turn help to ensure that proposals take into account the impacts of climate change when considering the availability of water.</p> <p><b>3.8 Environmental Regulation</b> - sets out that NSIP proposals may require (inter alia) abstraction licenses.</p> <p><b>3.12 Health</b> – this section highlights the relationship between water availability and human health.</p> <p><u>Recommendations for Improvement</u></p> <p>Section 3 of the draft NPS could usefully include WFD Assessment as a specific sub-heading. This would allow for further information and guidance to be provide in respect of the WFD and related assessments at the WRMP and project stage.</p>		
			<b>Draft NPS:</b>

## Water Quantity

Draft NPS Section	Draft NPS	No NPS	Appraisal
Summary Appraisal of Likely Significant Effects	+	+/?	<p>The construction and operation of new water resources infrastructure can have a wide range of effects on water quantity associated with, in particular, changes to abstraction regimes and flows; the magnitude of these effects will be dependent on the type, scale and location of development and the baseline water environment (including the availability of water for abstraction). In this context, the draft NPS requires (in liaison with key regulators and other bodies with an interest in the water environment) that potential impacts on water quantity are identified, assessed and, where necessary, mitigated. This is expected to help ensure the sustainable use of water resources.</p> <p>Overall, the draft NPS is considered to provide a clear framework to guide decisions on new water resources infrastructure in respect of the water environment. It complements existing national planning policy and legislation as well as the objectives of RBMPs in respect of the WFD and the development of WRMPs. In consequence, the draft NPS has been assessed as having a positive effect on this AoS objective.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of extant national planning policy and the EIA Regulations which require consideration of the effects of development proposals on water quantity. The abstraction licensing regime would also apply and proposals would continue to be identified through the WRMP process which would include the consideration of effects on water quantity and availability. In consequence, even without the NPS, this alternative would still be considered to have a positive effect in relation to water quantity. However, the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level.</p>
Summary of Recommended Mitigation and Enhancement	<p>The draft NPS makes a positive contribution to the water quantity AoS objective. It identifies a range of issues that should be considered in terms of preparing and determining an application. However, section 4.15 of the draft NPS could be enhanced through, in particular:</p> <ul style="list-style-type: none"><li>• provision of further advice and guidance for applicants in respect of water quantity and water resource availability;</li><li>• provision of guidance for applicants in respect of opportunities for the enhancement of the water environment;</li><li>• provision of further guidance on the possible contents of an ES;</li><li>• provision of more definitive guidance in respect of the circumstances in which the Secretary of State would refuse consent due to unacceptable impacts on water quantity;</li><li>• inclusion of more explicit guidance in terms of the impacts of nationally significant water resources infrastructure on water resource availability and water quantity;</li></ul>		

## Water Quantity

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<ul style="list-style-type: none"><li>inclusion of WFD Assessment as a specific sub-heading (in Section 3 of the draft NPS).</li></ul> <p>Additional mitigation is suggested based on a review of draft WRMPs and their associated SEA Environmental Reports. This includes:</p> <ul style="list-style-type: none"><li>Careful consideration should be given to the establishment of a compensation flow regime in respect of reservoir development;</li><li>Detailed modelling of hydrological changes and analysis of effects should be undertaken;</li><li>Consideration should be given to the findings and recommendations of any WFD Assessment prepared in support of the relevant WRMP. Where necessary, a WFD Assessment for the proposed development should be undertaken.</li></ul>		

## Flood Risk and Coastal Change

# 7. Flood Risk and Coastal Change

## 7.1 Introduction

This section presents the overview of plans and programmes and baseline information for the appraisal of sustainability of the National Policy Statement for Water Resources Infrastructure and reasonable alternatives in respect of flood risk and coastal change.

Flood risk within this context is defined as the risk of coastal, river, surface water, sewer and groundwater flooding. Coastal change in this context has been defined narrowly to include coastal processes coastal erosion.

There are links between flood risk and coastal change and a number of other Appraisal of Sustainability (AoS) topics, in particular water quality, water quantity and climatic factors.

## 7.2 Review of Plans and Programmes

A significant proportion of the UK population is at risk of flooding, with the level of risk ranging from minor through to potentially life threatening. As such, there is a well established policy framework to identify, quantify, assess, avoid, minimise and mitigate flood risk in the UK. Key to the protection of people, homes and communities is the consideration of the long-term effects of climate change in terms of how issues such as increased rainfall and sea level rise will be managed. Water resources infrastructure will also need to be designed to take into account flood risk, both in terms of the direct threat to infrastructure from flooding as well as ensuring that the infrastructure is appropriate given the anticipated increase in flood risk.

### International/European

The **Floods Directive (2007/60/EC)** aims to provide a consistent approach to managing flood risk across Europe. The approach is based on a 6 year cycle of planning which includes the publication of Preliminary Flood Risk Assessments, hazard and risk maps and flood risk management plans. The Directive is transposed into English law by the **Flood Risk Regulations 2009** (SI 2009/3042).

The Floods Directive is linked to the **Water Framework Directive (WFD) (2000/60/EC)** and requires flood risk appraisals to be produced at a River Basin District scale and working with the timing of the WFD River Basin Planning cycles.

The **Marine Strategy Framework Directive (2008/56/EC)** requires Member States to take the necessary measures to achieve or maintain good environmental status in the marine environment by 2020 at the latest through the development and implementation of marine strategies.

### UK

The **Reservoirs Act 1975** makes provision against escapes of water from large reservoirs or from lakes or lochs artificially created or enlarged. Amendments to this act include those made by the **Water Act 2003** giving the Secretary of State the power to direct undertakers in relation to a large raised reservoir to prepare a "flood plan" setting out the action they would take in order to control or mitigate the effects of flooding likely to result from any escape of water from the reservoir. In addition, **The Reservoirs Act 1975 (Capacity, Registration, Prescribed Forms, etc.) (Wales) Regulations 2016** are intended to ensure the ongoing

## Flood Risk and Coastal Change

protection of public safety by reducing the risk of an uncontrolled release of water from large reservoirs and the potentially catastrophic flooding this would cause.

The **Flood and Water Management Act 2010** contains provisions for regional working and co-operation such as the establishment of regional flood and coastal committees and the bringing together of lead local flood authorities, who will have a duty to cooperate, to develop local strategies for managing local flood risk. In addition, the **Flood Risk Regulations 2009** (SI 2009/3042) impose a duty on the Environment Agency, Natural Resources Wales and lead local flood authorities to take steps to identify and prepare for significant flood risk.

The **Climate Change Act 2008** also imposes a duty on the UK Government to compile every five years an assessment of the risks and opportunities arising for the UK from climate change, including in relation to flood and coastal erosion risks. The UK Committee on Climate Change Adaptation Sub-committee ('the UK CCC ASC') is responsible for preparing these climate change risk assessments, the latest of which, the second UK Climate Change Risk Assessment (CCRA2) Evidence Report, was published in July 2016<sup>231</sup>.

As set out in **Section 5, Shoreline Management Plans (SMPs)** assess the risks to people, development and the natural and historic environment from coastal processes.

The **Marine and Coastal Access Act 2009** for England and Wales provides the legal mechanism to help ensure clean, healthy, safe, productive and biologically diverse oceans and seas by putting in place a new system for improved management and protection of the marine and coastal environment. The Act comprises several key elements or parts. In relation to coastal processes (in the context of this report), three elements are particularly pertinent. First, the Act allows for the creation of a Marine Management Organisation (MMO) to deliver marine functions in the waters around England and in the UK offshore area (for matters that are not devolved), including the preparation of marine plans; the Welsh Ministers are the relevant Marine Planning Authority for the Welsh inshore and offshore regions. Second, the Act creates a new UK-wide strategic marine planning system to enable more strategic and effective management of seas. Third, the Act makes changes to the marine licensing system that will result in more consistent licensing decisions for marine works and activities.

The Marine Strategy Framework Directive has been transposed into UK law through the **Marine Strategy Regulations 2010** (SI 2010/1627). It aims to achieve good environmental status of the EU's marine waters by 2021 and to protect the resource base upon which marine-related economic and social activities depend.

The main objectives of the **Marine Policy Statement (2011)** prepared under the Marine and Coastal Access Act 2009 are to enable an appropriate and consistent approach to marine planning across UK waters, and to ensure the sustainable use of marine resources and strategic management of marine activities from renewable energy to nature conservation, fishing, recreation and tourism.

## England

The Floods Directive is transposed into English and Welsh law through the **Flood Risk Regulations 2009** (SI 2009/3042) which complement the Flood and Water Management Act 2010. Following this legislation, the 2011 Environment Agency **National Flood and Coastal Erosion Risk Management Strategy for England**<sup>232</sup> seeks to ensure that flooding and coastal erosion risks are well-managed and co-ordinated, so that their impacts are minimised through better understanding of the risks, management of the likelihood, helping

<sup>231</sup> UK CCC ASC (2016) *UK Climate Change Risk Assessment 2017: CCRA2 Evidence Report*. Available online at: <https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/>

<sup>232</sup> Environment Agency (2011) *National flood and coastal erosion risk management strategy for England*. Available online at: <https://www.gov.uk/government/publications/national-flood-and-coastal-erosion-risk-management-strategy-for-england>

## Flood Risk and Coastal Change

people to manage their own risk, preventing inappropriate development and improving flood prediction and post-flood recovery.

Section 171 of the **Housing and Planning Act 2016** requires the Secretary of State to carry out a review of planning legislation, government planning policy and local planning policies concerning sustainable drainage in relation to the development of land in England, and this is presently ongoing.

The MMO has identified 11 marine planning areas (MPAs) around England and is currently preparing marine plans for these areas, all of which are scheduled to be in place by 2021 and thereafter reviewed every 3 years. The East Inshore and East Offshore marine plan areas were the first two areas where work commenced on their marine plans, with other areas now following.

To complement the National Flood and Coastal Erosion Risk Management Strategy for England, risks associated with coastal change are being addressed through **Shoreline Management Plans**, whilst information on the national risk from coast erosion has been collated. **Surface Water Management Plans** are being developed and revised across England (and Wales), with accompanying technical guidance<sup>233</sup>.

The **National Planning Policy Framework (MHCLG, 2018)** (at paragraph 155) seeks to avoid inappropriate development in areas at risk of flooding by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. Technical guidance published alongside the NPPF sets out how this policy should be implemented, including the Flood Risk and Coastal Change section of the **Planning Practice Guidance** and Defra's **Non-statutory technical standards for sustainable drainage systems**<sup>234</sup>. Local Plans should be supported by Strategic Flood Risk Assessments and develop policies to manage flood risk from all sources, taking account of advice from the Environment Agency and other relevant flood risk management bodies, such as lead local flood authorities and internal drainage boards. Local Plans should apply a sequential, risk-based approach to the location of development to avoid where possible flood risk to people and property and manage any residual risk, taking account of the impacts of climate change. This includes applying a sequential test to steer new development to areas with the lowest probability of flooding. Local planning authorities are also expected to set out the strategic priorities for their area in the Local Plan including strategic policies to deliver the provision of infrastructure for flood risk and coastal change management.

When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider appropriate development in areas at risk of flooding, informed by a site-specific flood risk assessment (NPPF paragraph 163). A site-specific flood risk assessment is required for all development in Flood Zones 2 and 3. In Flood Zone 1, a flood risk assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use<sup>235</sup>.

Flood defence consents under the **Land Drainage Act 1991** and the **Water Resources Act 1991** (and associated byelaws) will be required if any of the following apply:

<sup>233</sup> Defra (2010) *Surface Water Management Plan Technical Guidance*. Available online at:

<https://www.gov.uk/government/publications/surface-water-management-plan-technical-guidance>

<sup>234</sup> Defra (2015) *Non-statutory technical standards for sustainable drainage systems*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/415773/sustainable-drainage-technical-standards.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/415773/sustainable-drainage-technical-standards.pdf)

<sup>235</sup> MHCLG (2018) *National Planning Policy Framework*. Available online at:

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/740441/National\\_Planning\\_Policy\\_Framework\\_web\\_accessible\\_version.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740441/National_Planning_Policy_Framework_web_accessible_version.pdf)



## Flood Risk and Coastal Change

- works in, over, under, or within the byelaw margin of main rivers, or likely to affect the integrity of tidal defences;
- raising ground levels in the floodplain beside a main river; and
- constructing or altering a culvert or structure to control the flow of the river (such as a weir) on any ordinary watercourse.

**A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)** includes policies and actions to reduce risks from flooding and coastal erosion including expanding the use of natural flood management solutions, putting in place more sustainable drainage systems and making 'at-risk' properties more resilient to flooding.

## Scotland

The **Flood Risk Management (Scotland) Act 2009** includes a duty placed upon Scottish Ministers, the SEPA, local authorities, Scottish Water and other responsible authorities to exercise their functions with a view to managing and reducing flood risk and to promote sustainable flood risk management. As a means of identifying the highest risk areas, **Surface Water Management Plans** are being developed across the country, based on accompanying technical guidance<sup>236</sup>.

The **Climate Change (Scotland) Act 2009** requires the Scottish Ministers to lay a Climate Change Adaptation Programme before the Scottish Parliament after the UK Secretary of State publishes a climate change risk assessment report, as required by the Climate Change Act 2008. The first **Climate Ready Scotland: Scottish Climate Change Adaptation Programme**, which included consideration of climate related flood risks, was published in March 2014 and another will follow once the second UK Climate Change Risk Assessment (CCRA2) is finalised in 2017

**Flood Risk Management Strategies for Scotland** are in place for all 14 local plan districts. The Strategies set out the most sustainable combination of actions to address flooding in the areas at greatest risk, where the benefits of intervention can have the greatest impact. Taken together, the 14 Flood Risk Management Strategies provide a national plan for Scotland. These are then turned into a local delivery plan by the 14 **Flood Risk Management Strategies** adopted by each district. They provide more detail on how and when the actions from the strategy will be delivered locally, providing additional details on the costs, benefits and delivery timetable for actions.

Scotland's **National Marine Plan (2015)**<sup>237</sup> has been adopted by the Scottish Government and is a single framework to enable the sustainable development of Scotland's marine area in a way which will protect and enhance the marine environment, whilst ensuring the sustainable growth of both existing and emerging marine industries.

The key aims of the **Scottish Planning Policy (SPP) (2014)** in relation to flooding are:

- to prevent developments which would be at significant risk of being affected by flooding;
- to prevent developments which would increase the probability of flooding elsewhere; and

<sup>236</sup> Scottish Government (2013) *Surface Water Management Planning Guidance*. Available online at: <http://www.scotland.gov.uk/Publications/2013/02/7909> and The Scottish Government (2015) *Online Planning Advice on Flood Risk*. Available online at:

<http://www.gov.scot/Topics/Built-Environment/planning/Policy/Subject-Policies/natural-resilient-place/Flood-Drainage/Floodrisk-advice>

<sup>237</sup> Scottish Government (2015) *Scotland's National Marine Plan*. Available online at: <http://www.gov.scot/Resource/0047/00475466.pdf>

## Flood Risk and Coastal Change

- to provide a basis for planning decision making related to flood risk (the SPP provides a risk framework which divides flood risk into three categories and outlines an appropriate planning response).

With regard to flood risk, the SPP (2014) states that developers and planning authorities should take a precautionary approach in making decisions when flood risk is an issue and that development should not take place on land that could otherwise contribute to managing flood risk, for instance through managed coastal realignment, washland creation or as part of a scheme to manage flood risk. With respect to coastal issues, SPP states that planning authorities should take the likely effect of proposed development on the marine environment into account when making decisions on planning applications. The SPP also notes that the risks associated with rising sea levels and coastal flooding should be taken into account when identifying areas that are suitable for development.

## Wales

The Floods Directive is transposed into English and Welsh law through the **Flood Risk Regulations 2009** (SI 2009/3042) which complement the Flood and Water Management Act 2010. Following this legislation, the Welsh Government **National Strategy for Flood and Coastal Erosion Risk Management in Wales (2011)** sets out four overarching objectives for the management of flood and coastal erosion risk in Wales including reducing the consequences of flooding, raising flood risk awareness and prioritising flood risk management for the most vulnerable communities.

Chapter 13: Minimising and managing environmental risks and pollution of **Planning Policy Wales (Edition 9) (2016)** sets out the policies of the Welsh Government regarding flood risk and climate change. Flood risk, whether inland or from the sea, is a material consideration in land use planning. The Welsh Government's objective in relation to flood risk management is to move towards positive avoidance of development in areas defined as being of flood hazard.

In support of Planning Policy Wales, **TAN 14: Coastal planning (1998)** and **TAN 15: Development and flood risk (2004)** provide detailed planning advice on their respective subjects. TAN 14 provides advice on planning the coastal zone, recreation, heritage coasts and non-statutory coastal groupings and shoreline management plans. TAN 15 provides advice on development advice maps, nature of development or land use, justifying the location of built development, assessing flooding consequences, surface water run-off from new development, action through development plans and development control.

The **Environment (Wales) Act 2016** establishes a Flood and Coastal Erosion Committee and contains a range of other relevant provisions. This committee replaced the Flood Risk Management Wales (FRMW), which was established under section 22 of the Flood and Water Management Act 2010 to scrutinise the work and budget of Environment Agency Wales, now Natural Resources Wales (NRW). The establishment of this committee seeks to resolve dual accountability issues and to adopt a wider, advisory/consultative role than solely the scrutiny role previously undertaken by FRMW. In doing so the new committee is responsible for providing advice to the Welsh Ministers on a wider range of flood and coastal erosion issues from various bodies, not just to NRW.

**Welsh Water 2050** provides a long-term vision to address future trends including an ageing population, climate change, customer expectations and the digital age economy. In order to mitigate the challenges and harness the opportunities of these trends, the strategy includes 14 strategic responses which will ensure resilient and sustainable water service for the benefit of future generations.

The **Recommended non-statutory standards for sustainable drainage (SuDS) in Wales** recommends standards that promote more natural SuDS systems in new development and aid developers, local authorities

## Flood Risk and Coastal Change

and other stakeholders to demonstrate that they have taken account of the Welsh Government's planning advice on development and flood risk.

### 7.3 Overview of the Baseline

#### UK

Flooding is associated with a range of sources: river, coastal, surface water, sewer, groundwater and reservoir<sup>238</sup>.

Coastal erosion is occurring along 17% of the UK coastline<sup>239</sup>. Sea levels are rising, and are greater in the south of the UK than the north. The global-average sea level rose during the 20th century at an average rate of 1-2 mm/year, with some consensus on the larger value by the research community. The rate was larger (approximately 3mm/year) during the 1990s. UK sea level records are consistent with these values but with smaller trends observed in Scotland (where the land is uplifting) than in the south of the UK<sup>240</sup>.

#### England

Approximately 2.4 million properties in England are currently at risk from flooding from rivers and the sea, of which approximately 155,000 residential properties are within high flood risk areas, and around 3 million properties are at risk from surface water flooding, including approximately 215,000 residential properties within high flood risk areas. The total area of agricultural land at risk of flooding is around 12% (1.3 million ha) whilst 122,000 and 290,000 properties are located within areas at risk of groundwater flooding (not including properties also in areas at risk of flooding from rivers and the sea)<sup>241</sup>.

Regionally, Greater London has the highest number of people at risk from flooding, with around 542,000 properties and one million people located in the floodplain. However, although London does have the largest number of people at risk, 84% are in areas with a low chance of flooding. This is mainly due to the major flood defences and flood defence structures in the Thames Estuary, including the Thames Barrier. The City of Kingston-upon-Hull and East Riding in Yorkshire are the two local authorities with the highest number of properties with a chance of flooding. However, other local authorities, such as Boston and North Somerset, have a higher share of properties in areas of significant flood risk. For instance, Boston has about two-thirds of its properties in areas with a significant chance of flooding<sup>242</sup>.

<sup>238</sup> Environment Agency. *Sources of flooding*. Available online at:

<http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/homeandleisure/floods/31652.aspx>

<sup>239</sup> Marine Climate Change Impacts Partnerships. *Impacts of climate change on coastal erosion*. Available online at:

<http://www.mccip.org.uk/annual-report-card/2013/climate-of-the-marine-environment/coastal-erosion/>

<sup>240</sup> Marine Climate Change Impacts Partnerships (2013) *MCCIP Report Card 2013*. Available online at:

<http://www.mccip.org.uk/media/1301/mccip-arc2013.pdf>

<sup>241</sup> Environment Agency (2016) *Adapting to a changing climate: The Environment Agency's second adaptation report under the Climate Change Act*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/526000/climate-adrep-environment-agency.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/526000/climate-adrep-environment-agency.pdf) and

Environment Agency (2015) *Managing flood and coastal erosion risks in England: 1 April 2014 to 31 March 2015*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/447646/LIT\\_10125\\_FCERM\\_Annual\\_Report\\_2014\\_to\\_2015.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/447646/LIT_10125_FCERM_Annual_Report_2014_to_2015.pdf)

<sup>242</sup> Environment Agency (2009) *Flooding in England: A National Assessment of Flood Risk*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/292928/geho0609bqds-e-e.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/292928/geho0609bqds-e-e.pdf)

## Flood Risk and Coastal Change

Coastal erosion is occurring along 30% of England's coastline<sup>243</sup> and current estimates suggest that around 740 properties in England are vulnerable to coastal erosion by around 2030, with a further 1,500 vulnerable by around 2060<sup>244</sup>. Of the regions in England, Yorkshire and Humber has the greatest proportion of coastal length which is eroding at 56% (203km). Coastal erosion is occurring along 30% to 32% of the south east, and south west coastlines whilst 27% and 18% of the north east and north west coastlines respectively are eroding. The East Midlands has the smallest proportion of coastal length which is eroding at 9% or 21km<sup>245</sup>.

### Scotland

In Scotland, SEPA has mapped a strategic national overview of flood risk in Scotland from rivers and the sea<sup>246</sup>. Around 1 in 22 of all residential properties and 1 in 13 non-residential properties is at medium risk of flooding from all sources (i.e. areas where the risk of flooding is greater than a 1 in 200 annual probability)<sup>247</sup>. The fourteen approved Flood Risk Management Strategies identify 'Potentially Vulnerable Areas' across Scotland and characterise flood risk within these<sup>248</sup>. Coastal erosion is occurring along 12% of Scotland's coastline<sup>249</sup>.

### Wales

As at March 2014 there were 208,000 properties shown to be at risk from river and / or sea flooding in Wales, 61,000 being at high or medium risk (greater than a 1% chance every year). 163,000 properties were at risk of surface water flooding, with 43,000 being at high or medium risk<sup>250</sup>.

Across the local authorities in Wales, Cardiff has the highest numbers of properties at risk from flooding from rivers or the sea. However, many of these are at low risk (less than one in 200 chance in any given year), mainly because of the flood defence structures in place in Cardiff. Conwy has the largest number of properties at significant risk (greater than a 1 in 75 chance in any given year). This is largely because of the coastal flood risk. Coastal flooding is also the cause of the significant risk to property in Gwynedd and Newport<sup>251</sup>.

<sup>243</sup> Marine Climate Change Impacts Partnerships (2015) *Coastal erosion and coastal geomorphology*. Available online at: <http://www.mccip.org.uk/annual-report-card/2007-2008/marine-environment/coastal-erosion.aspx>

<sup>244</sup> Environment Agency (2016) *Adapting to a changing climate: The Environment Agency's second adaptation report under the Climate Change Act*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/526000/climate-adrep-environment-agency.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/526000/climate-adrep-environment-agency.pdf)

<sup>245</sup> Marine Climate Change Impacts Partnerships. Impacts of climate change on coastal erosion. Available online at: <http://www.mccip.org.uk/annual-report-card/2013/climate-of-the-marine-environment/coastal-erosion/>

<sup>246</sup> Scottish Environment Protection Agency (2015) *Flood Maps*. Available online at: <http://map.sepa.org.uk/floodmap/map.htm>

<sup>247</sup> SEPA (2015) *Strategic Environmental Assessment: Flood Risk Management Strategies Environmental Report – consultation*. Available online at: [http://www.sepa.org.uk/media/163415/sea\\_environmental\\_report.pdf](http://www.sepa.org.uk/media/163415/sea_environmental_report.pdf)

<sup>248</sup> SEPA (2015) *Flood Risk Management Strategies*. Available online at: <http://apps.sepa.org.uk/FRMStrategies/>

<sup>249</sup> Marine Climate Change Impacts Partnerships (2015) *Coastal erosion and coastal geomorphology*. Available online at: <http://www.mccip.org.uk/annual-report-card/2007-2008/marine-environment/coastal-erosion.aspx>

<sup>250</sup> Natural Resources Wales (2015) *Flood and Coastal Erosion Risk Management in Wales, 2011-2014*. Available online at: <http://naturalresources.wales/media/1039/flood-and-coastal-erosion-risk-management-in-wales-2011-2014.pdf>

<sup>251</sup> Environment Agency Wales (2009) *Flooding in Wales: A National Assessment of Flood Risk*. Available online at: [http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/static/documents/Research/ENV0005\\_Flooding\\_in\\_Wales\\_ENGLISH\\_AW\\_LR\(1\).pdf](http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/static/documents/Research/ENV0005_Flooding_in_Wales_ENGLISH_AW_LR(1).pdf)

## Flood Risk and Coastal Change

Coastal erosion is occurring along 23% of Wales' coastline<sup>252</sup>. Natural Resources Wales estimate that 2,126 properties in Wales are vulnerable to coastal erosion during the next 100 years if there is no active intervention. It is considered that this figure would be reduced to 145 with full implementation of Shoreline Management Plan 2 policies.

### 7.4 Summary of Existing Problems Relevant to the Water Resources NPS

The following existing problems for flood risk and coastal change have been identified:

- Some 15% of UK properties are at risk from flooding (surface water, river or coastal), although the degree of risk varies.
- The UK Climate Change Risk Assessment 2017: Projections of future flood risk projected that the number of residential properties exposed to flooding more frequently than 1:75 years (on average) increases from 860,000 today to between 1.2 million and 1.7 million properties in 2080, depending on the scenario considered.
- Sea levels are rising, with worst case scenarios of a 1.9m increase in sea level by 2100 (with up to 0.76m more likely). The south and east of England will experience the greatest effective increases, due to the effects of post-glacial rebalancing.
- Many coastal sites (especially in the south and east of the country) are already prone to erosion, due to their underlying geology, coupled with rising sea levels and increased storm intensity. Increasing development pressures on and around the coastal environment (often accompanied by coastal engineering projects such as sea defences) are conflicting with the need for their effective management in the face of climate change. Shoreline Management Plans (in England and Wales) are taking a long-term view of coastal change by identifying sustainable management approaches for up to the next 100 years.
- Flood risk presents a significant planning issue in the development of major infrastructure projects, both in terms of potential direct impacts on the project itself and indirect impacts associated with works (such as increased run-off).

### 7.5 Likely Evolution of the Baseline

#### UK

Climate change is likely to exacerbate erosion and flooding as a result of sea level rise together with a potential increase in the intensity, severity and frequency of storm events over the next 100 years. The most recent information for the UK from the UK Climate Impacts Programme (UKCIP) forecasts a range of relative sea level rise by the 2080s (relative to the 1961-1990 mean) of between 20 and 80cm in south-west England and 0 and 60cm in Scotland.

The scenarios in UKCIP 09 lead to several predictions relevant to flooding:

<sup>252</sup> Marine Climate Change Impacts Partnerships (2015) *Coastal erosion and coastal geomorphology*. Available online at: <http://www.mccip.org.uk/annual-report-card/2007-2008/marine-environment/coastal-erosion.aspx>

## Flood Risk and Coastal Change

- Annual average precipitation across the UK may decrease by between 0% and 15% by the 2080s, depending on the scenario.
- The seasonal distribution of precipitation will change. Winters will become wetter and summers drier. The biggest relative changes will be in the south and east. Under the High emissions scenario, winter precipitation in the south-east may increase by up to 30% by the 2080s.
- By the 2080s, the daily precipitation intensities that are experienced once every two years on average may become up to 20% heavier. The scenarios give no guidance on the effects of climate change on more extreme precipitation events.
- By the 2080s, depending on scenario, relative sea level may be between 2cm below and 58cm above the current level in western Scotland and between 26 and 86cm above the current level in south-east England.
- For some coastal locations, a water level that at present has a 2% annual probability of occurrence may have a 33% annual probability by the 2080s for Medium High emissions<sup>253</sup>.

**UK Climate Change Risk Assessment 2017: Projections of future flood risk**<sup>254</sup>, which was commissioned by the UK CCC ASC to inform the CCRA2 projected that the number of residential properties exposed to flooding more frequently than 1:75 years (on average) increases significantly; increasing from 860,000 today to 1.2 million (a 40% increase) by the 2080s under a 2°C increase in Global Mean Temperature (GMT), and to 1.7 million (a 93% increase) under 4°C. The area of Special Protection Areas, Special Areas of Conservation and Ramsar sites exposed to flooding more frequently than 1:75 (on average) increases by 25% and 44% for 2°C and 4°C respectively by the 2080s. The area of Best and Most Versatile (BMV) agricultural land at risk from flooding increases by 32% and 65% under these climate projections. Impacts on social infrastructure are similar to those seen for residential property. By the 2080s, for scenarios based on GMT increases of 2°C and 4°C respectively, the number of care homes located in the highest flood probability category increase by 48% and 140%; schools by 32% and 95%; emergency services sites by 36% and 100%; hospitals by 23% and 68%; and GPs surgeries by 46% and 140%, assuming current levels of adaptation are continued and no population growth.

## England

The latest set of projected changes in climate for England comes from the 2009 UK Climate Projections. Under a medium emissions (A1B) scenario, regional summer mean temperatures are projected to increase by between 0.9 – 5.2°C by the 2050s compared to a 1961-1990 baseline.

Assuming no population growth and a continuation of current levels of adaptation, it is considered that by the 2050s the projected number of people at 1:75 or greater risk of flooding rises to around 1.7 million under a 2 degree scenario and 2.2 million for a 4 degree scenario. For the 2080s, the projections suggest 2 million people under a 2 degree scenario and 2.9 million people under a 4 degree scenario. Expected annual damage to residential properties is projected to rise by between 22 – 78% in the 2050s and 47 – 160% in the 2080s depending on climate scenario.

<sup>253</sup> UK Climate projections. *Maps and key findings*. Available online at:

<http://ukclimateprojections.defra.gov.uk/21708#key>

<sup>254</sup> Sayers, P.B; Horritt, M; Penning-Rowsell, E; McKenzie, A (2015) *Climate Change Risk Assessment 2017: Projections of future flood risk in the UK. Research undertaken by Sayers and Partners on behalf of the Committee on Climate Change*. Available online at:

<https://www.theccc.org.uk/wp-content/uploads/2015/10/CCRA-Future-Flooding-Main-Report-Final-06Oct2015.pdf>



## Flood Risk and Coastal Change

Given the depth limited nature of the wave conditions along much of the coast of England, sea level is the most significant factor affecting loading on coastal defences, with the total amount of coastline at risk increasing from an estimated 114km in the 2020s to 171km in the 2080s. Sea level rise for London is expected to increase by between 35 – 49.7cm by 2090 depending on the emissions scenario, compared to a 1990 baseline.

Around 480,000 ha of Best and Most Versatile (BMV) agricultural land is currently at a 1-in-75 or greater annual chance of flooding from rivers, surface water or the sea. This is projected to increase by 15% by the 2050s under a 2 degree centigrade rise in mean global temperatures and 41% under a 4 degree centigrade rise. Over 40,000 ha of agricultural land were inundated during the 2007 floods in England, causing damage estimated at £50 million. The floods and storm surge in 2013/14 caused an estimated £19 million of damage to agriculture.

Warmer, wetter winters and drier summers in the future could increase rates of soil weathering and increase soil erosion. This could in turn increase peak flows and hence fluvial and groundwater flood risk. This risk will be exacerbated where soils are degraded and compacted due to land management practices (medium magnitude/medium confidence)<sup>255</sup>.

The Environment Agency estimates that over 700 properties could be lost to coastal erosion by around 2030, and over 2,000 could be lost by around 2060. These estimates take into account the interventions set out in shoreline management plans. Without the interventions, these figures could increase to about 5,000 properties by 2030 and about 28,000 by 2060<sup>256</sup>.

## Scotland

As noted in **Section 6.2** above, **Flood Risk Management Strategies for Scotland** have been currently being prepared for 14 local plan districts, covering all of Scotland. These identify Potentially Vulnerable Areas where flood risks are greatest and set out the most sustainable combination of actions to address flooding in these areas. **Local Flood Risk Management Plans** have been developed in parallel and will provide additional local detail on the funding and delivery timetable for actions in six yearly periods, the first of which runs from 2016-2021<sup>257</sup>.

The **UK Climate Change Risk Assessment 2017 Evidence Report – Summary for Scotland**<sup>258</sup> notes that some coastal communities especially in the Hebrides, areas of the Solway Firth, Firth of Clyde and the coastline from Moray to Fife (including Aberdeen) may be at risk from increased storminess and wave overtopping, however there are uncertainties over the scale and timing of these risks.

On average, coastal floods have occurred once or twice a year based with a seasonal peak in winter (especially in January or February). The North Atlantic Oscillation (NAO) (the difference in sea level atmospheric pressure between the Azores and Iceland) is a major driver for storms and coastal floods in the North Atlantic. Positive values of the NAO index are associated with higher incidence of coastal floods in

<sup>255</sup> UK CCC ASC (2017) *UK Climate Change Risk Assessment 2017 Evidence Report – Summary for England*. Available online at: <https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-England-National-Summary-1.pdf>

<sup>256</sup> Environment Agency (2015) *Managing flood and coastal erosion risks in England: 1 April 2014 to 31 March 2015*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/447646/LIT\\_10125\\_FCERM\\_Annual\\_Report\\_2014\\_to\\_2015.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/447646/LIT_10125_FCERM_Annual_Report_2014_to_2015.pdf)

<sup>257</sup> SEPA (2015) *Flood Risk Management Strategies*. Available online at: <http://apps.sepa.org.uk/FRMStrategies/>

<sup>258</sup> UK CCC ASC (2017) *UK Climate Change Risk Assessment 2017 Evidence Report – Summary for Scotland*. Available online at: <https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Scotland-National-Summary.pdf>

## Flood Risk and Coastal Change

Scotland. As it is likely that NAO will become more positive by 2080, the frequency of coastal flooding may also increase<sup>259</sup>.

### Wales

Assuming no population growth and a continuation of current levels of adaptation, by the 2080s, the projections from the CCRA suggest 142,000 people under a 2 degree scenario and 209,000 people under a 4 degree scenario would be living in areas of Wales at a 1-in-75 or greater chance of flooding in any given year. Expected annual damage to residential properties in Wales is projected to rise by between 35 – 110% in the 2050s and 59 – 220% in the 2080s depending on climate scenario.

Some locations in Wales are known to be at risk from long-term changes to the coastline, such as the village of Fairbourne. Baseline rates of coastal erosion are between 30 and 100 metres per century. With sea-level rise, the rates could be 1.75 – 2.5 higher than the baseline due to strengthened wave action and other factors (equivalent to 52 – 250 metres per century). The West of Wales Shoreline Management Plan states that while the Fairbourne's defences can and should be maintained for several decades (c. 40 years) in the long term the defences are unsustainable. The dominant factor in the case of Fairbourne is the rate of sea-level rise, about which there is much uncertainty<sup>260</sup>.

## 7.6 Assessing Significance

The objectives and guide questions related to food risk and coastal change which have been identified for use in the appraisal of the effects of Water Resources NPS proposals are set out in **Table 7.1**, together with reasons for their selection.

**Table 7.1 Approach to Assessing the Effects of the Water Resources NPS Proposals on Flood Risk and Coastal Change**

Objective/Guide Question	Reasoning
<b>Objective: To minimise the risks from coastal change and flooding to people, property, communities and habitats and species, taking into account the effects of climate change.</b>	<p>The SEA Directive (2001/42/EC) requires that the likely significant effects on the environment, which includes population, human health, climatic factors, material assets and their integration, should be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.</p> <p>Flood risk presents a significant planning issue in the development of major infrastructure projects, both in terms of potential direct impacts on the project itself and indirect impacts associated with works (such as increased run-off). The operation of water resources infrastructure (e.g. reservoirs) may provide an opportunity to address flood risk issues (for example, by providing extra space for flood water storage). The inclusion of this AoS objective ensures that these effects can be considered within the AoS.</p>
Will the Water Resources NPS help to avoid development in areas of flood risk? Where development in flood risk areas cannot be avoided,	Minimising flood risk is a key part of sustainable development and is reflected in relevant legislation (such as Flood Risk Regulations 2009 and the Flood and Water Management Act 2010). Environmental and planning policy seeks to

<sup>259</sup> SNIFFER (2008)

<http://www.sniffer.org.uk/Webcontrol/Secure/ClientSpecific/ResourceManagement/UploadedFiles/FRM10%20final%20030908%20with%20security.pdf>

<sup>260</sup> UK CCC ASC (2017) *UK Climate Change Risk Assessment 2017 Evidence Report – Summary for Wales*. Available online at:

<https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Wales-National-Summary.pdf>



## Flood Risk and Coastal Change

Objective/Guide Question	Reasoning
will the NPS ensure that appropriate mitigation measures are applied to avoid increasing flood risk and, where possible, reduce flood risk?	ensure that new development does not exacerbate risks (e.g. paragraph 100 of the National Planning Policy Framework 2018).
Will the Water Resources NPS affect the resilience of infrastructure, places, communities and habitats and species to future flooding?	Changes to the frequency and severity of floods can affect the ability of sensitive receptors to recover from flooding events.
Will the Water Resources NPS help to avoid development in areas affected by coastal erosion and not affect coastal processes and/or erosion rates?	Changes to coastal processes or erosion rate caused by development have a potential to negatively impact on the marine environment. The Marine Strategy Framework Directive (2008/56/EC) requires member states to achieve or maintain good environmental status in the marine environment by 2020. Planned changes to coastal processes should be consistent with shoreline management plans.

**Table 7.2** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the flood risk and coastal change objective.

**Table 7.2** Illustrative Guidance for the Assessment of Significance for Flood Risk and Coastal Change

Effect	Description	Illustrative Guidance
++	Significant Positive	<ul style="list-style-type: none"> <li>Option would result in a significant decrease in people or property at risk of, or affected by, flooding, coastal inundation or sea level rise.</li> </ul>
+	Positive	<ul style="list-style-type: none"> <li>Option would result in a decrease in people or property at risk of, or affected by, flooding, coastal inundation or sea level rise.</li> </ul>
0	Neutral	<ul style="list-style-type: none"> <li>Option would not lead to an overall change in the number of people or property at risk of, or affected by, flooding, coastal inundation or sea level rise.</li> <li>Option would result in development being sited in Flood Zone 1 (or equivalent) areas.</li> </ul>
-	Negative	<ul style="list-style-type: none"> <li>Option would result in an increase in people or property at risk of, or affected by, flooding, coastal inundation or sea level rise.</li> <li>Option would result in development being sited in Flood Zone 2 (or equivalent) areas.</li> </ul>
--	Negative	<ul style="list-style-type: none"> <li>Option would result in a significant number of people or property affected by flooding, coastal inundation or sea level rise.</li> <li>Option would result in development being sited in Flood Zone 3 (or equivalent) areas.</li> </ul>
?	Uncertain	<ul style="list-style-type: none"> <li>From the level of information available, the effect that the option would have on this objective is uncertain.</li> </ul>

## Flood Risk and Coastal Change

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### Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 7.3** presents the appraisal of the likely significant effects of the draft NPS presents the appraisal of the likely significant effects of the draft NPS and the 'no NPS' reasonable alternative on the flood risk and costal change objective. The appraisal considers in-turn the three subsections used for each topic within Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making (subdivided into specific areas of interest) and Mitigation. The performance of the draft NPS and the 'no NPS' alternative are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters 1 – 3 of the draft NPS outlining how the remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the two reasonable alternatives is then summarised along with any proposed mitigation measures.

## Flood Risk and Coastal Change

Table 7.3 Appraisal of the Draft NPS and Reasonable Alternatives: Flood Risk and Coastal Change

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	+	+/?	<p><b>Draft NPS:</b> With regard to flood risk, the text in the draft NPS under the heading of 'Applicant's Assessment' states in section 4.8.5:</p> <p><i>"Applications for infrastructure projects in the following locations should be accompanied by a flood risk assessment:</i></p> <ul style="list-style-type: none"> <li><i>Flood Zones 2 and 3 (medium and high probability of river and sea flooding);</i></li> <li><i>Flood Zone 1 (low probability of river and sea flooding) for projects of 1 hectare or greater (or where strategic flood risk assessments identify land as being at increased flood risk in future), or projects which may be subject to other sources of flooding (local watercourses, surface water, groundwater or reservoirs), or where the EA has notified the local planning authority that there are critical drainage problems."</i></li> </ul> <p>4.8.6 "(...) Surface water flood issues need to be understood and these issues taken into account (...)"</p> <p>4.8.7 "The applicant should identify and assess the risks of all forms of flooding to and from the development, and demonstrate how these flood risks will be managed, taking climate change into account".</p> <p>General guidance on the likely contents of a Flood Risk Assessment (FRA) is provided in para 4.8.8 whilst a requirement for early consultation with the relevant regulators and other flood risk management bodies is set out in para 4.8.9.</p> <p>In respect of coastal change, the draft NPS (under the heading of 'Applicant's Assessment' in section 4.5) states:</p> <p>4.5.5 "Applications for development in a Coastal Change Management Area (CCMA) should make it clear why there is a need for it to be located in a Coastal Change Management Area. If this is the case, applicants should consult the local planning authority, EA and other relevant bodies on the scope of an assessment of the vulnerability of the proposed development to coastal change, to help demonstrate its appropriateness in such a location. The applicant should take into account the potential impacts of climate change during the infrastructure's operational life) using the latest UK Climate Change Risk Assessment, the latest set of UK Climate Projections, and other relevant sources of climate change evidence."</p> <p>The draft NPS (para 4.5.6) also sets out that for any projects involving dredging or which could impact on coastal change, the applicant should consult the Marine Management Organisation (MMO) at an early stage. The text then notes that the applicant should identify any effects of physical changes on the integrity and special features of Marine Conservation Zones, candidate marine Special Areas of Conservation (SACs), coastal SACs and candidate coastal SACs, coastal Special Protection</p>

## Flood Risk and Coastal Change

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>Areas (SPAs) and potential coastal SPAs, Ramsar sites, Sites of Community Importance (SCIs) and potential SCIs and Sites of Special Scientific Impacts (SSSIs).</p> <p>The guidance contained in the draft NPS will help to ensure that flood risk and coastal change are duly taken into account in the applicant's decision making process, that effects are fully identified and assessed and that appropriate mitigation and enhancement measures are implemented. Overall, there are likely to be positive effects on the flood risk and coastal change AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>Section 4.8 of the draft NPS could make specific reference to the need to consider the resilience of infrastructure, places, communities and habitats and species to future flooding.</p> <p>In section 4.5, reference could be made to Shoreline Management Plans (SMPs) and Marine Plans (although it is noted that this is referred to under 'Decision Making'). Specific reference could also be made to the need for applicants to prepare a coastal change impact study (CIS) (or similar) for schemes located in coastal areas, in consultation with the Environment Agency and coastal groups.</p> <p>There is no detailed guidance on the potential contents that should form part of the ES with respect to flood risk and coastal change. Specification of the contents of the ES could be drawn from the following, which in turn serves as the reference point for the detail of the 'Decision Making' section:</p> <ul style="list-style-type: none"> <li>• Scoping <ul style="list-style-type: none"> <li>○ Identify the likely zone of influence of the proposed development;</li> <li>○ Describe the baseline environment including in respect of topography, land use, hydrology and geology;</li> <li>○ Identify and evaluate resources and features with the potential to be affected by flood risk (e.g. residential properties, biodiversity and historic environment);</li> <li>○ Describe any future anticipated changes to the baseline in the absence of the proposed project, to inform the assessment of impacts;</li> <li>○ Provide the basis for determining significance of effects arising from the impacts.</li> </ul> </li> <li>• Impact assessment</li> </ul>

## Flood Risk and Coastal Change

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>○ Assess and characterise the impacts and their effects (including scale, duration and significance) outlined in the scoping assessment, informed by the FRA and CIS (where required)</li> <li>○ Assess the residual impacts of the project remaining after mitigation and the significance of their effects, including cumulative effects.</li> <li>• Avoidance, mitigation, compensation and enhancement <ul style="list-style-type: none"> <li>○ Identify and incorporate measures to avoid, reduce and compensate impacts, and the provision of enhancements.</li> <li>○ Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.</li> </ul> </li> </ul> <p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and the EIA Regulations. It is also expected that local flood risk management plans and strategies would inform development proposals. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on flood risk and coastal change. However, the absence of a clear statement on the full range of considerations to be taken into account in respect of flood risk and coastal change (as proposed in the draft NPS) risks inconsistency in interpretation and unintended consequences through implementation.</p> <p>Overall, this reasonable alternative is considered to have a positive, albeit uncertain, effect on the flood risk and coastal change objective.</p>
<b>Decision Making</b>	+	+/?	<p><b>Draft NPS:</b> With specific regard to flood risk, the text in the draft NPS under the heading of 'Decision Making' states that in determining an application for development consent, the Secretary of State should be satisfied that, where relevant:</p> <ul style="list-style-type: none"> <li>• the application is supported by an appropriate FRA;</li> <li>• the Sequential Test has been applied as part of site selection and, if required, the Exception Test as set out in the NPPF;</li> <li>• a sequential approach has been applied at the site level to minimise risk by directing the most vulnerable development to areas of lowest flood risk, unless there are overriding reasons to prefer a different location;</li> <li>• in flood risk areas, the infrastructure is appropriately flood resilient and resistant, including safe access and escape routes where required, and that any residual risk can be safely managed over the lifetime of the development.</li> </ul>

## Flood Risk and Coastal Change

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>the potential effects of climate change on the development have been considered as part of the design using the latest UK Climate Change Risk Assessment the latest set of UK Climate Change Projections and other relevant sources of climate change evidence.</li> </ul> <p>For construction work which could have drainage implications, the draft NPS states in para 4.8.15 that approval for the development's drainage system will form part of any development consent issued by the Secretary of State, who will expect sustainable drainage systems (SuDS) to be put in place unless demonstrated to be inappropriate.</p> <p>Para 4.8.15 provides further guidance on determining an application as follows: <i>"If the Environment Agency maintains an objection to the grant of development consent on the grounds of flood risk, the Secretary of State can grant consent, but would need to be satisfied that all reasonable steps have been taken by the applicant and the EA to attempt to resolve the concerns. Similarly, if the lead local flood authority objects to the development consent on the grounds of surface or other local sources of flooding, the Secretary of State can grant consent, but would need to be satisfied that all reasonable steps have been taken by the applicant and the lead local flood authority to attempt to resolve the concerns."</i></p> <p>With specific regard to coastal change, the draft NPS under the heading of 'Decision Making' states:</p> <p>4.5.8 <i>"When assessing applications in a Coastal Change Management Area, the Secretary of State should not grant development consent unless it is demonstrated that:</i></p> <ul style="list-style-type: none"> <li><i>the development will be safe (from flood risk and coastal erosion) over its planned operational lifetime and will not have an unacceptable impact on coastal change;</i></li> <li><i>the character of the coast (including designations) is not compromised;</i></li> <li><i>the development provides wider sustainability benefits; and</i></li> <li><i>the development does not hinder the creation and maintenance of a continuous, signed and managed route around the coast."</i></li> </ul> <p>4.5.9 <i>"Essential utilities infrastructure may be granted development consent in a Coastal Change Management Area, provided there are clear plans to manage the impacts of coastal change on it, and it will not have an adverse impact on rates of coastal change elsewhere."</i></p> <p>The draft NPS goes on to state that the Secretary of State must also have regard to the appropriate marine policy documents and may have regard to relevant SMPs in taking any decision which relates to the exercise of any function capable of affecting any part of the UK marine area. However, if there is conflict between the draft NPS and these plans, the draft NPS prevails.</p>

## Flood Risk and Coastal Change

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>Overall, the draft NPS is expected to have a positive effect on this AoS objective due to the direction given to the Secretary of State to consider flood risk and coastal change when assessing development proposals (in the context of existing plans and strategies on flood risk and coastal change) and to give priority to the use of SUDS and resilience, which is consistent with existing national planning policy and guidance.</p> <p><u>Recommendations for Improvement</u></p> <p>None identified.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and EIA Regulations which would have a positive, albeit uncertain, effect against the flood risk and coastal change objective. The uncertain effects arise from, e.g. , the absence of clear statements on the role of the Secretary of State when assessing the location of development, the inclusion and use of an appropriate FRA, sequential and exception testing, SuDS and reasons for refusing development consent (as proposed in the draft NPS).</p>
Mitigation	+	+/?	<p><b>Draft NPS:</b> With specific regard to flood risk, the text in the draft NPS under the heading of 'Mitigation' states:</p> <p>4.8.16 <i>"The applicant should ensure that the development's design takes into account flood risk, and should put forward measures to mitigate the impact of flooding. (...)"</i></p> <p>4.8.17 <i>"To manage flood risk satisfactorily and the impact of the natural water cycle on people, property and ecosystems, good design and infrastructure may need to be secured using requirements and/or planning obligations. This may include the use of sustainable drainage systems but could also include vegetation to help to slow runoff, hold back peak flows, and make landscapes more able to absorb the impact of severe weather events."</i></p> <p>The draft NPS then provides examples of sustainable drainage systems in para 4.8.18.</p> <p>The requirements for any surface water drainage systems proposed as part of a development are set out in para 4.8.19, para 4.8.20 and para 4.8.21. These include the requirement to cope with events that exceed the design capacity of the system and to limit the volumes and peak flow rates of surface water leaving a site to no greater than the rates prior to the proposed project, taking into account climate change (unless specific off-site arrangements are made and result in the same net effect) which may involve the use of surface water storage and infiltration.</p> <p>At para 4.8.22, the draft NPS states that <i>"The sequential approach should be applied to the layout and design of the project. Vulnerable uses should be located on parts of the site at lower probability and residual risk of flooding. The applicant should seek</i></p>

## Flood Risk and Coastal Change

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>opportunities where appropriate to use open space for multiple purposes such as amenity, wildlife habitat, and flood storage uses. Opportunities can be taken to lower flood risk by improving flow routes, flood storage capacity and using sustainable drainage systems."</p> <p>In terms of coastal change, the draft NPS under the heading of 'Mitigation' states:</p> <p>4.5.12 "Applicants should propose appropriate mitigation measures to address any adverse physical changes to the coast in consultation with the Marine Management Organisation, the Environment Agency, Natural England, Natural Resource Wales, Scottish Natural Heritage, Local Planning Authorities, other statutory consultees, Coastal Partnerships and other coastal groups, as it considers appropriate. The Secretary of State should consider whether the mitigation requirements put forward by an applicant are acceptable and will be delivered and whether any requirements and /or obligations should be attached to any grant of development consent in order to secure their delivery."</p> <p>4.5.13 "Resilient and long term adaptive design could help to mitigate against coastal change. The Secretary of State should ensure that any development consent granted in a CCMA (Coastal Change Management Area) is not impacted by coastal change – if necessary by limiting the planned life-time of the proposed development and including restoration requirements where these are necessary to reduce the risk to people and the development."</p> <p>More specific mitigation measures are provided in the 'Introduction' sections to the flood risk and coastal change topics.</p> <p>Overall, it is considered that the provisions of the draft NPS outlined above make a positive contribution to this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>To inform the appraisal of sections 4.5 and 4.8 of the draft NPS, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on flood risk and coastal change has been undertaken. This review is intended to help identify where any additional measures could be included in the draft NPS (in the introduction or mitigation section of the topics) to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p> <p>The following text identifies the anticipated flood risk and coastal change impacts and associated mitigation measures. These have been identified within the draft NPS but are discussed again here to provide the necessary context for the recommended mitigation measures.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p> <p><i>Construction</i></p>



## Flood Risk and Coastal Change

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>Reservoir construction works may be liable to flooding, and/or cause or exacerbate flooding elsewhere, particularly where development sites are located in Flood Zones 2 or 3.</p> <p><i>Operation</i></p> <p>Associated infrastructure may be at risk of flooding, particularly where development sites are located in Flood Zones 2 or 3. Any increase in impermeable areas as a result of development may also cause increased flood risk elsewhere due to surface water runoff. However, new or enlarged reservoirs may provide an opportunity to address existing flood risk (for example, by providing extra space for flood water storage and by increasing monitoring and control of flows).</p> <p><b>Water Transfer Schemes</b></p> <p><i>Construction</i></p> <p>Construction works associated with water transfer schemes may be liable to flooding, and/or cause or exacerbate flooding elsewhere, particularly where development sites are located in Flood Zones 2 or 3/cross watercourses.</p> <p><i>Operation</i></p> <p>Associated infrastructure may be at risk of flooding, particularly where development sites are located in Flood Zones 2 or 3. Any increase in impermeable areas may also result in increased flood risk elsewhere due to surface water runoff.</p> <p><b>Desalination</b></p> <p><i>Construction</i></p> <p>The construction of desalination plants may be liable to flooding, and/or cause or exacerbate flooding elsewhere, particularly where development sites are located in Flood Zones 2 or 3.</p> <p>Desalination plants using sea water, by their nature, are located near coastal areas and require significant land take. Construction of defences to protect the infrastructure such as sea walls, has the potential to impact coastal erosion elsewhere.</p> <p><i>Operation</i></p> <p>A desalination plant may be at risk of flooding, particularly where the development site is located in Flood Zones 2 or 3. Any increase in impermeable areas may also result in increased flood risk elsewhere due to surface water runoff.</p> <p>Desalination plants using sea water, by their nature, will be located at or near to coastal areas. There is a potential for these to be located in areas vulnerable to coastal erosion or where sea level rises may impact operation of the plant. There is also the potential for the operation of plants to affect coastal/beach erosion.</p>

## Flood Risk and Coastal Change

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>No additional mitigation measures beyond those already identified in the draft NPS have been identified.</b></p> <p><b>No NPS:</b> Under this alternative, appropriate mitigation measures will be considered by the competent authority in light of the proposals submitted. As such, mitigation measures will be applied but there is the risk that this is open to interpretation and thereby does not fully address an appropriate range of activities which are directly related to a scheme.</p> <p>Overall, even without the NPS, this alternative would still be considered to have a positive effect in relation to this AoS objective, although a degree of uncertainty persists.</p>
<b>Other Sections of the Draft NPS Relevant to Flood Risk and Coastal Change</b>	<p>The following provides additional commentary on the text in the other sections of the draft NPS relevant to flood risk and coastal change. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b><u>1 Introduction</u></b></p> <p><b>1.1. Background and scope of this NPS</b> - at para 1.1.5 the consideration of flood risk and coastal change is reflected in the need to apply the draft NPS in the context of section 104 of the Planning Act. This should help ensure that related effects, (both positive and negative), in so far as they are relevant to planning, are balanced. The net result of this balancing exercise could be uncertain, however.</p> <p>With regards to para 1.1.8, there is an opportunity for the consideration of effects on flood risk and coastal change in a specific locality through the preparation of a local impact report submitted by a local authority in accordance with the Planning Act. There is no prescribed format for local impact reports but there is clearly an opportunity for a local authority to comment on this topic as an issue, helping to ensure that consideration is given to likely effects in a particular locality.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on flood risk and coastal change in Scotland and Wales.</p> <p><b>1.3. Infrastructure covered by the Water Resources NPS</b> – as part of the options identification and appraisal process (including Strategic Environmental Assessment (SEA)) undertaken in support of WRMPs, early consideration will be given to the impacts of options on flood risk and coastal change.</p> <p><b><u>2. Government Policy and the need for water resources infrastructure</u></b></p> <p><b>2.2. Pressure on water availability now and in the future</b> – this section makes specific reference to protecting and enhancing the environment as a key driver of the need for nationally significant water resources infrastructure.</p> <p><b>2.5. The role of water resource management plans in identifying the need</b> – as noted, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on flood risk and coastal change. This is reflected paragraph 2.5.7.</p>		

## Flood Risk and Coastal Change

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>2.6 The role of nationally significant infrastructure projects</b> – this section identifies that alongside reservoirs, water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP, when assessed against the relevant threshold in the Planning Act 2008 or through a section 35 referral. These infrastructure types may have impacts on flood risk and coastal change of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p> <p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p>This section also highlights the potential for water resources infrastructure such as reservoirs to provide increased resilience to flood risk.</p> <p><b>3. Assessment Principles</b></p> <p><b>3.1 General principles of assessment</b> - the provisions of the Planning Act 2008 and the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, provides the starting point for the consideration of flood risk and coastal change.</p> <p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on flood risk and coastal change.</p> <p><b>3.2 Environmental Impact Assessment</b> – the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that this topic is fully considered, as will the consideration of cumulative effects and interrelationships between effects. This section specifically highlights that information gathered from the WRMP options assessments and the draft NPS will also be useful to identify the significant effects of a proposed project.</p> <p><b>3.4. Environmental Net Gain</b>- consideration of opportunities for environmental net gain during the WRMP options appraisal process and in the detailed design of schemes will help to ensure that opportunities are identified to deliver flood risk and coastal change enhancements. It is noted that this section advises that water companies consider using natural capital accounting and ecosystem services assessments to inform planning and underpin environmental improvements and that <i>"Applications for development consent must be accompanied by a statement demonstrating how opportunities for environmental net gain have been incorporated into the detailed design (including any relevant operational aspects) of the project"</i>.</p> <p><b>3.5 Assessing Alternatives</b> – the requirement that reasonable alternatives will need to be considered by the developer as part of scheme design and project planning including as part of the WRMP options appraisal process should ensure that flood risk and coastal change are taken into account, both in terms of protection and opportunities for mitigation and enhancement.</p> <p><b>3.6 Criteria for 'good design for water resources infrastructure</b> – attention to good design principles and implementation will be of benefit to flood risk and coastal change through the consideration of how a proposed scheme interacts with its context.</p>

## Flood Risk and Coastal Change

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<p><b>3.7 Climate change adaptation</b> – ensuring that any development is appropriately adapted to future climate change will help avoid impacts on flood risk and coastal change. In this regard, the text in this section states “... the applicant must consider the impacts of climate change when planning at the design, build and operational stages. . Section 4 of this NPS identifies areas where climate change adaptation should be incorporated into detailed design, such as flood risk and coastal change, biodiversity and nature conservation and water quality. Sections 4.4 and 4.14 also consider climate change mitigation, in terms of minimising energy use from processes and transportation.”</p> <p><b>3.10. Safety</b> – the consideration of safety could include flood risk and coastal change.</p> <p><b>3.12. Health</b> – states that where a proposed development has an impact on human health, the ES should assess these effects for each element of the project. This may include the consideration of flood risk and coastal change.</p>		
Summary Appraisal of Likely Significant Effects	+	+/?	<p><b>Draft NPS:</b> Depending on the type, scale and location of development, nationally significant water resources infrastructure may affect or be affected by flood risk and coastal change during both construction and operation. In this context, the draft NPS seeks to ensure that the risks of flooding and coastal change are identified, assessed and managed, taking climate change into account. It stipulates that the Secretary of State can refuse consent in Flood Zones 2 and 3 if the sequential and exception test, respectively, have not been satisfactorily applied which will help to avoid inappropriate development in areas of flood risk. The Secretary of State may grant development consent in a CCMA provided that there are plans to manage the impacts of coastal change on it and it will not have an adverse impact of rates of change elsewhere which should help to avoid development in areas affected by coastal erosion and not affect coastal processes and erosion rates.</p> <p>Overall, the draft NPS attaches substantial weight to the risks of flooding and coastal change. It seeks to reduce the effects of flood risk and coastal change on the natural environment, life and property through the effective design and location of development and deliver increased resilience. This, alongside other requirements set out in the draft NPS, existing national planning policy, local flood risk management plans and strategies and guidance will help to minimise direct and indirect effects with respect to flood risk and coastal change and has therefore been assessed as having a positive effect on this AoS objective.</p>
			<p><b>No NPS:</b> Despite the absence of a guiding framework for flood risk and coastal change impacts, this alternative is likely to result in positive effects overall as any development would be subject to the provisions of national planning policy and the EIA Regulations and would be likely to take into account local flood risk management plans and strategies and guidance. In addition, proposals would continue to be identified through the WRMP process which would include the consideration of effects on this AoS topic. However, the absence of a clear statement on the role of the Secretary of State when assessing the location of development in particular risks inappropriate development being considered. It is acknowledged that whilst</p>

## Flood Risk and Coastal Change

Draft NPS Section	Draft NPS	No NPS	Appraisal
			mitigation measures would be forthcoming under this alternative, there is a risk that these are not comprehensive or consistent and may not fully address any effects arising.
<b>Summary of Recommended Mitigation and Enhancement</b>	<p>The draft NPS makes a positive contribution to the flood risk and coastal change AoS objective. However, this section of the draft NPS could be enhanced through, in particular:</p> <ul style="list-style-type: none"> <li>the provision of further specific guidance for applicants with respect to the preparation of flood warning and evacuation plans for areas identified as at risk of flooding. This could include preparation of emergency planning documents, flood warning and evacuation procedures.</li> <li>the provision of further guidance on the possible contents of an ES;</li> <li>the strengthening of existing references to SMPs and Marine Plan in respect of applicants' assessments;</li> <li>the inclusion of reference to the need for applicants to prepare a CIS (or similar) for schemes located in coastal areas.</li> </ul> <p>No additional project-level mitigation beyond that already set out in the draft NPS has been identified.</p>		

## Air Quality

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# 8. Air Quality

## 8.1 Introduction

This section presents the overview of plans and programmes and baseline information for the appraisal of sustainability of the National Policy Statement for Water Resources and reasonable alternatives in respect of air quality.

Air quality within this context concerns the levels of pollutants emitted into the air and their significance, in terms of the risk of adverse effects on the environment and/or human health. Carbon dioxide (CO<sub>2</sub>) and other greenhouse gas emissions are excluded from the air quality topic and are reported under the climate change topic.

There are links between the air quality topic and other topics in the Appraisal of Sustainability (AoS) including biodiversity and nature conservation, human health, climatic factors and traffic and transport.

## 8.2 Review of Plans and Programmes

Whilst not directly commenting on water infrastructure, the regulations provide the legislative context to ensure that risks to air quality, particularly to the construction phase of any infrastructure, are minimised.

Policies are also in place to manage the levels of certain atmospheric pollutants, such as sulphur dioxide and nitrogen dioxide, which when deposited into aquatic environments can result in acidification and nitrogen eutrophication.

### International/European

The **Ambient Air Quality and Cleaner Air for Europe Directive (2008/50/EC)** consolidated earlier air quality directives and also defines and establishes objectives and targets for ambient air quality to avoid, prevent or reduce harmful effects on human health and the environment as a whole. It sets legally binding limits for concentrations in outdoor air of major air pollutants that impact on public health such as particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>) and nitrogen dioxide (NO<sub>2</sub>). The 2008 Directive replaced nearly all the previous EU air quality legislation and was implemented in England through the **Air Quality Standards Regulations 2010** (SI 2010/1001), which also incorporates the 4<sup>th</sup> air quality daughter **Directive 2004/107/EC** that set targets for levels in outdoor air of certain toxic heavy metals and polycyclic aromatic hydrocarbons. Equivalent regulations exist in Scotland (**The Air Quality Standards (Scotland) Regulations 2010** (SSI 2010/204)) and Wales (**The Air Quality Standards (Wales) Regulations 2010** (WSI 2010/1433)).

Following a review of EU air quality policy, the EU published the **Clean Air Policy Package** in 2013 with new proposals on ambient air quality and emissions ceilings. The package included a new **Clean Air Programme for Europe (2013)**, which set out new air policy objectives for 2030 to reduce health impacts and eutrophication in ecosystems. The package will also involve revisions to the National Emissions Ceiling Directive.

The objectives of the Clean Air Programme have been enacted via **Directive 2016/2284/EU** on the reduction of national emissions of certain atmospheric pollutants, which entered into force on 31 December 2016. This Directive sets national reduction commitments for the five pollutants (sulphur dioxide, nitrogen oxides, volatile organic compounds, ammonia and fine particulate matter) responsible for acidification,

## Air Quality

eutrophication and ground-level ozone pollution which leads to significant negative impacts on human health and the environment. It repealed and replaced Directive 2001/81/EC, the National Emission Ceilings Directive (NEC Directive) from the date of its transposition (30 June 2018)<sup>261</sup>.

The **Industrial Emissions Directive (IED) (2010/75/EU)** combines seven existing air pollution directives, including the Large Combustion Plant Directive and the Integrated Pollution Prevention and Control (IPPC) Directive. As with previous directives aimed at minimising emission release, part of the benefit of the IED is that it includes several new industrial processes, sets new minimum emission limit values (ELVs) for large combustion plant and addresses some of the implementation issues of the IPPC.

The UK monitors and models air quality to assess compliance with the air quality limit and target values set out in the EU legislation above. The results of the assessment are reported to the Commission on an annual basis. Air quality monitoring is also carried out by local authorities to meet local air quality management objectives.

## UK

Air quality is a devolved matter, though the UK Government leads on international and European legislation. Part IV of the **Environment Act 1995** sets provisions for protecting air quality in the UK and for local air quality management. It requires local authorities to undertake local air quality management (LAQM) assessments against the standards and objectives prescribed in regulations. Where any of these objectives are not being achieved, local authorities must designate air quality management areas and prepare and implement remedial action plans to tackle the problem.

The **Air Quality Standards Regulations 2010** (SI 2010/1001) transposed into English law the requirements of Directives 2008/50/EC and 2004/107/EC on ambient air quality. Equivalent regulations have been made by the devolved administrations in Scotland (**The Air Quality Standards (Scotland) Regulations 2010** (SSI 2010/204) and Wales (**The Air Quality Standards (Wales) Regulations 2010** (WSI 2010/1433)). The objective of the Regulations is to improve air quality by reducing the impact of air pollution on human health and ecosystems. The standards set out air quality objectives, limit values and target values for pollutants, namely benzene, 1,3 butadiene, carbon monoxide, lead, nitrogen dioxide, sulphur dioxide, PM<sub>10</sub>, and PM<sub>2.5</sub>.

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2007) sets out a way forward for work and planning on air quality issues.

The **Ozone-Depleting Substances Regulations 2015** (SI 2015/168) introduces controls on the production, use and emissions from equipment of a large number of 'controlled substances' that deplete the ozone layer.

The **Environmental Permitting (England and Wales) Regulations 2016** (SI 2016/1154) sets up a pollution control regime. The environmental regulator would specify conditions for environmental permits, for example limiting the type and quantity of emissions released to air.

The **Local Air Quality Management: Technical Guidance (TG 16) 2016** sets out the technical guidance and approach for local authorities to carry out their responsibilities under the Environment Act 1995, the Environment (Northern Ireland) Order 2002, and subsequent regulations. This includes their responsibility to monitor, assess and take action to improve local air quality including Air Quality Management Areas<sup>262</sup>.

In July 2017 the UK Government has published the **UK plan for tackling roadside nitrogen dioxide concentrations**. It sets out the UK Government's plan for bringing nitrogen dioxide air pollution within

<sup>261</sup> <http://ec.europa.eu/environment/air/pollutants/ceilings.htm>

<sup>262</sup> Defra (2016) *Local Air Quality Management: Technical Guidance (TG 16)*. Available online at: <https://laqm.defra.gov.uk/documents/LAQM-TG16-April-16-v1.pdf>

## Air Quality

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statutory limits in the shortest possible time as it is the only statutory air quality limit that the UK is currently failing to meet. This is important for water courses and soils as NO<sub>2</sub> contributes to acidification and eutrophication.

### England

The **National Planning Policy Framework (MHCLG, 2018)** expects the planning system to prevent new development from contributing to unacceptable levels of air pollution. Planning policies and decisions are therefore expected to ensure that new development is appropriate for its location and take into account “*The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution*” (paragraph 120).

The Framework expects planning policies to “sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas. Planning decisions should ensure that any new development in Air Quality Management Areas is consistent with the local air quality action plan” (paragraph 124). In doing so, local planning authorities are expected to focus on whether the development itself is an acceptable use of the land, and the impact of the use, rather than the control of processes or emissions themselves where these are subject to approval under pollution control regimes.

Planning Practice Guidance relating to Air Quality<sup>263</sup> provides guiding principles on how planning can take account of the impact of new development on air quality. The guidance provides information a range of topics including why planning should be concerned about air quality, the role the local plan has in regards to air quality, what information is available about air quality and when air quality could be relevant to a planning decision.

**A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)** includes policies and actions to reduce air pollution including a commitment to publish a Clean Air Strategy and curbing emissions from combustion plants and generators.

### Scotland

The purpose of the **Scottish Planning Policy (SPP) (2014)** is to set out national planning policies which reflect Scottish priorities for operation of the planning system and for the development and use of land. It highlights the important role that planning has in realising sustainable development and protecting natural heritage, including air. In addition to this, **Scotland's Third National Planning Framework (2014)** is the spatial expression of the Government Economic Strategy and Scottish plans for infrastructure investment. It notes that air quality can be improved through reducing the impact of transport on city and town centres and the significant health benefits this would bring.

The Scottish Executive's **Air Quality and Land Use Planning (2004)** guidance outlines some of the main ways in which land use planning can help deliver air quality objectives.

**Cleaner Air for Scotland: The Road to a Healthier future (2015)** is the national strategy that sets out how the Scottish Government and its partner organisations propose to reduce air pollution further to protect human health and fulfil Scotland's legal responsibilities as soon as possible.

**Delivering Cleaner Air for Scotland – Development Planning & Development Management (2017)** presents guidance from Environmental Protection Scotland and the Royal Town Planning Institute Scotland

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<sup>263</sup> <https://www.gov.uk/guidance/air-quality--3>



## Air Quality

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the tailors the UK-wide approach to planning and air quality protection to be relevant for the Scottish planning system and associated air quality objectives.

### Wales

The **Air Quality Standards (Wales) Regulations 2010** bring into law in Wales the limits set out in European Union (EU) Daughter Directives on Air Quality. The regulations require that Welsh Ministers divide Wales into air quality zones.

The **Well-being of Future Generations (Wales) Act 2015** requires public bodies including the Welsh Government to undertake sustainable development. At the national level, the Welsh government have published 46 national indicators for Wales, which includes 'Levels of nitrogen dioxide (NO<sub>2</sub>) pollution in the air' (Indicator No. 4).

**Planning Policy Wales (Edition 9) (2016)** sets out the land use planning policies of the Welsh Government. Regarding air quality, Planning Policy Wales sets out potential material planning considerations in relation to: location and site selection; impact on health and amenity; the risk and impact of potential pollution from the development as well as the effect of the surrounding environment; the prevention of nuisance; and the impact on the road and other transport networks.

In June 2017 the Welsh Government published **Local Air Quality Management in Wales 2017** which provides policy guidance on the overall approach to local air quality management in Wales.

## 8.3 Overview of the Baseline

### UK

The UK is compliant with its 2010 national emission ceilings for air pollutants. National emissions totals each year for the main pollutants are reported to the European Commission.

In 1990 UK emissions of Nitrogen Oxide (NO<sub>x</sub>) (as NO<sub>2</sub>) were 2.7 Mt. These have reduced to 1.1 Mt in 2011 and continued to reduce up to the latest 2014 data from the National Atmospheric Emissions Inventory<sup>264</sup>. This has largely been due to abatement measures for road transport and at coal-fired power stations. Sulphur dioxide (SO<sub>2</sub>) emissions in the UK have reduced from 3.7 Mt in 1990 to 0.4 Mt in 2007. This is largely due to the decrease in the use of coal and use of increasingly effective abatement<sup>265</sup>.

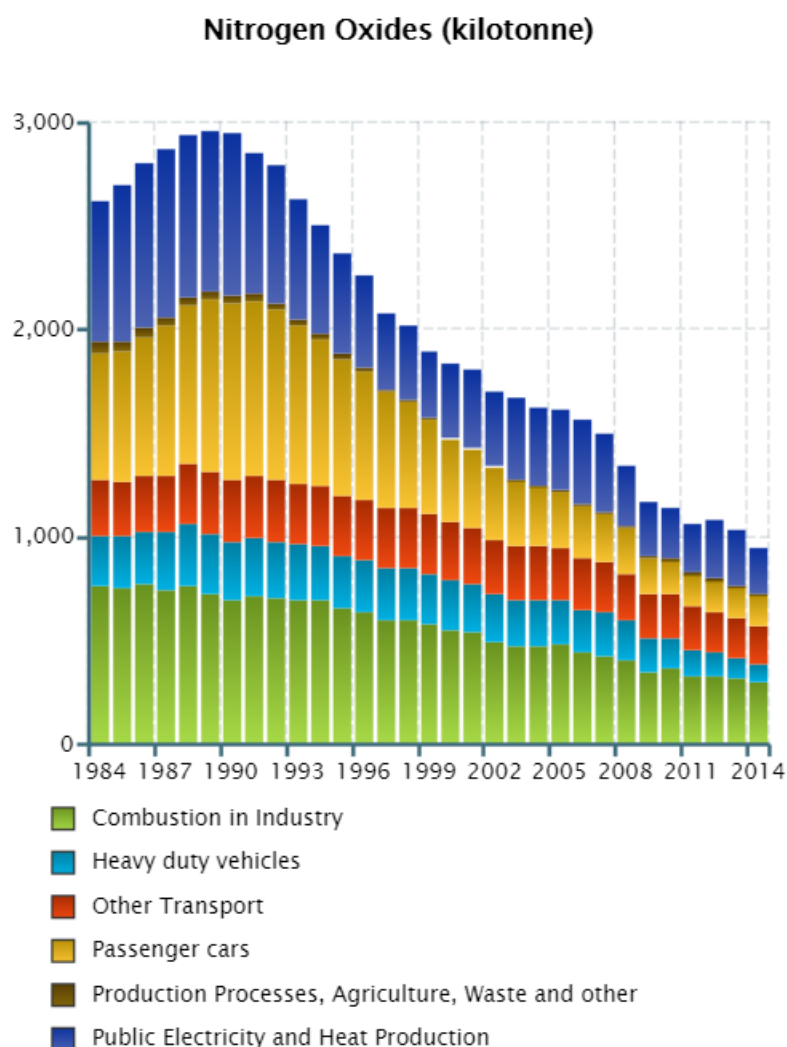
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<sup>264</sup> National Atmospheric Emissions Inventory (2017) *About Nitrogen Oxides*. Available online at: [http://naei.defra.gov.uk/overview/pollutants?pollutant\\_id=6](http://naei.defra.gov.uk/overview/pollutants?pollutant_id=6)

<sup>265</sup> Defra - AQPI Summary Report: Emissions of Air Quality Pollutants – 1970-2011

## Air Quality

Figure 8.1 Estimated Annual UK Emissions of Nitrogen Oxides (kt)



**Source:** National Atmospheric Emissions Inventory

Urban background and roadside particulate pollution has shown long-term improvement however small increases in concentration are observed from 2015 to 2016 for roadside sites. There is some year-on-year variability with a long-term downward trend in urban background and roadside particulate pollution. For background sites the concentration of particulate pollution was similar in 2015 and 2016<sup>266</sup>.

In 2017, 254 Local Authorities in the UK had declared Air Quality Management Areas (AQMAs), a designation made by a Local Authority where an assessment of air quality results in the need to devise an action plan to improve the quality of air<sup>267</sup>. AQMAs are predominantly in urban areas along busy and congested road networks and are generally related to nitrogen dioxide (NO<sub>2</sub>) (in 93% of cases), with particulates (PM<sub>10</sub>)

<sup>266</sup> Defra (2017) *National Statistics Release: Air quality statistics in the UK, 1987 to 2016*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/610927/Air\\_Quality\\_National\\_Statistic\\_apr17\\_FINAL.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/610927/Air_Quality_National_Statistic_apr17_FINAL.pdf)

<sup>267</sup> <https://uk-air.defra.gov.uk/aqma/maps>

## Air Quality

featuring in 6% of cases and SO<sub>2</sub> in 1%. Transport is identified as the main source of pollution for the clear majority of all AQMAs<sup>268</sup>.

The UK is divided into 43 zones for ambient air quality reporting. This includes 28 agglomeration zones and 15 non-agglomeration zones. In 2015, two zones had locations where the 1-hour limit value for NO<sub>2</sub> was exceeded on more than the permitted 18 occasions during 2015. They were the Greater London Urban Area (UK0001) and South Wales (UK0041). The remaining 41 zones and agglomerations complied with the 1-hour mean NO<sub>2</sub> limit value.

Six zones met the annual mean limit value for NO<sub>2</sub> in 2015:

- Brighton/Worthing/Littlehampton (UK0010);
- Blackpool Urban Area (UK0022);
- Preston Urban Area (UK0023);
- Highland (UK0039);
- Scottish Borders (UK0040);
- Northern Ireland (UK0043).

The remaining 37 zones had locations with measured or modelled annual mean NO<sub>2</sub> concentrations higher than the annual mean limit value (40 µg m<sup>-3</sup>).

## England

As of 2017 there are 221 local authorities in England with Air Quality Management Areas (AQMAs), 33 of which were within London<sup>269</sup>. As many Local Authorities have multiple AQMAs, there are a total of 626 AQMAs in England. Most AQMAs in England (and the UK as a whole) are in urban areas and result from traffic emissions of nitrogen dioxide or PM<sub>10</sub>. Emissions from transport (road and other types) are the main source in 97% of the AQMAs declared for NO<sub>2</sub>; only a few have been declared as a result of other sources, such as industrial or domestic emissions.

## Scotland

As of 2017 there are 14 Local Authorities in Scotland with a declared AQMA<sup>270</sup>. Air quality annual mean air quality trend data up to and including 2014 shows that with regards to NO<sub>2</sub> at urban background monitoring sites there is a decreasing trend year-on-year, albeit the decrease is relatively small. For traffic related monitoring sites there is a greater variation in trends, with four of the nine monitoring sites showing a downward trend, one site showing an upward trend and four sites showing no significant trend. As such it is considered that concentrations of this pollutant depend greatly on conditions at the various sites.

Urban background PM<sub>10</sub> concentrations were shown to be reducing at all four monitoring stations. PM<sub>10</sub> concentrations were also reducing at the urban traffic sites. Annual mean trends for PM<sub>2.5</sub> vary between the 5 monitored sites, with two showing a clear upward trend, one showing a clear downward trend and two

<sup>268</sup> Defra (2009) *Review of local air quality management*. Available online at:

<http://webarchive.nationalarchives.gov.uk/20130402151656/http://archive.defra.gov.uk/environment/quality/air/airquality/local/documents/lagm-report.pdf>

<sup>269</sup> <https://uk-air.defra.gov.uk/aqma/maps>

<sup>270</sup> Ibid

## Air Quality

showing no significant change. Rural concentrations of zone have shown a minor upward trend, with urban concentrations reducing<sup>271</sup>.

### Wales

Air quality in Wales continues to improve year on year and both emissions and ambient concentrations of key pollutants are decreasing, though annual average concentrations across the country have started to level out in recent years.

Urban air quality in Wales is generally worse than in rural areas. The main causes of pollution at urban sites are fine particles (PM<sub>10</sub>) and ozone (O<sub>3</sub>). The main cause of pollution in rural areas is the variation in ozone levels, which is affected by the weather. Four Welsh monitoring sites (Rhondda Mountain Ash, Caerphilly Hafodyrnys, Newport M4 Junction 25 and Swansea Station Court High Street) exceeded the annual mean objective of 40 µg m<sup>-3</sup> for NO<sub>2</sub>. Caerphilly Hafodyrnys and Rhondda Mountain Ash also exceeded the AQS Objective for hourly mean NO<sub>2</sub> concentration on more than the permitted 18 occasions in 2015. One site in Wales exceeded the AQS Objective for O<sub>3</sub> (100 µg m<sup>-3</sup> as a maximum daily 8-hour mean) on more than the permitted 10 occasions. This was Pembroke Power Station<sup>272</sup>.

As of 2017, there are 10 Local Authorities with a declared AQMA<sup>273</sup>. There are 26,353 people living in AQMAs in Wales. This represents 0.9% of the total population of Wales.

## 8.4 Summary of Existing Problems Relevant to the Water Resources NPS

The following existing problems for air quality have been identified:

- Poor air quality is generally associated with urban/industrial areas and major road infrastructure. A relatively large number of AQMAs are located in urban areas, many of which have been designated due to high NO<sub>2</sub> and PM<sub>10</sub> levels.
- Historical emissions have resulted in high levels of sulphur and nitrogen deposits in wetter parts of the UK such as northern England and the Welsh uplands. This has resulted in acidification and nitrogen eutrophication in some areas. Around a third of the UK land area is sensitive to acid deposition and a third to eutrophication. By 2010, the percentage of sensitive habitat area where acid deposited exceeded critical load was 49%. Similarly, 68% of sensitive habitat area exceeded the critical load as a result of nitrogen<sup>274</sup>.

<sup>271</sup> <http://www.scottishairquality.co.uk/data/trends>

<sup>272</sup> Welsh Assembly Government & Welsh Air Quality Forum (2015) *Air pollution in Wales 2015*. Available online at: [http://www.welshairquality.co.uk/documents/reports/507161019\\_AQ\\_wales\\_2015\\_v12\\_Press.pdf](http://www.welshairquality.co.uk/documents/reports/507161019_AQ_wales_2015_v12_Press.pdf)

<sup>273</sup> Ibid

<sup>274</sup> Joint Nature Conservation Committee (2014) *Air Pollution Bulletin*. Available online at: [http://jncc.defra.gov.uk/pdf/Air\\_pollution\\_bulletin2\\_2014.pdf](http://jncc.defra.gov.uk/pdf/Air_pollution_bulletin2_2014.pdf)

## Air Quality

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### 8.5 Likely Evolution of the Baseline

#### UK

**Figure 8.2** identifies the trends in in UK sulphur dioxide, nitrogen oxides, non-methane volatile organic compounds, ammonia and particulate matter (PM<sub>10</sub>, PM<sub>2.5</sub>) emissions from 1970 to 2015.

In 2015, total emissions of NO<sub>x</sub> were 919 kt, and since 1990, emissions have decreased by 69%. In 2015, total emissions of SO<sub>2</sub> were 236 kt, and since 1990, emissions have decreased by 94%. In 2015, total emissions of NMVOCs had decreased by 72%<sup>275</sup> when compared to 1990 levels.

This is further evidenced by the NO<sub>x</sub> modelling undertaken for roads directly managed by local authorities and Transport for London. This projected trend did not take into account the effects of the plans itself. The data shows all local authorities achieving the statutory limit for NO<sub>2</sub> by 2025, except for Greater London, which would take a further 3 years<sup>276</sup>.

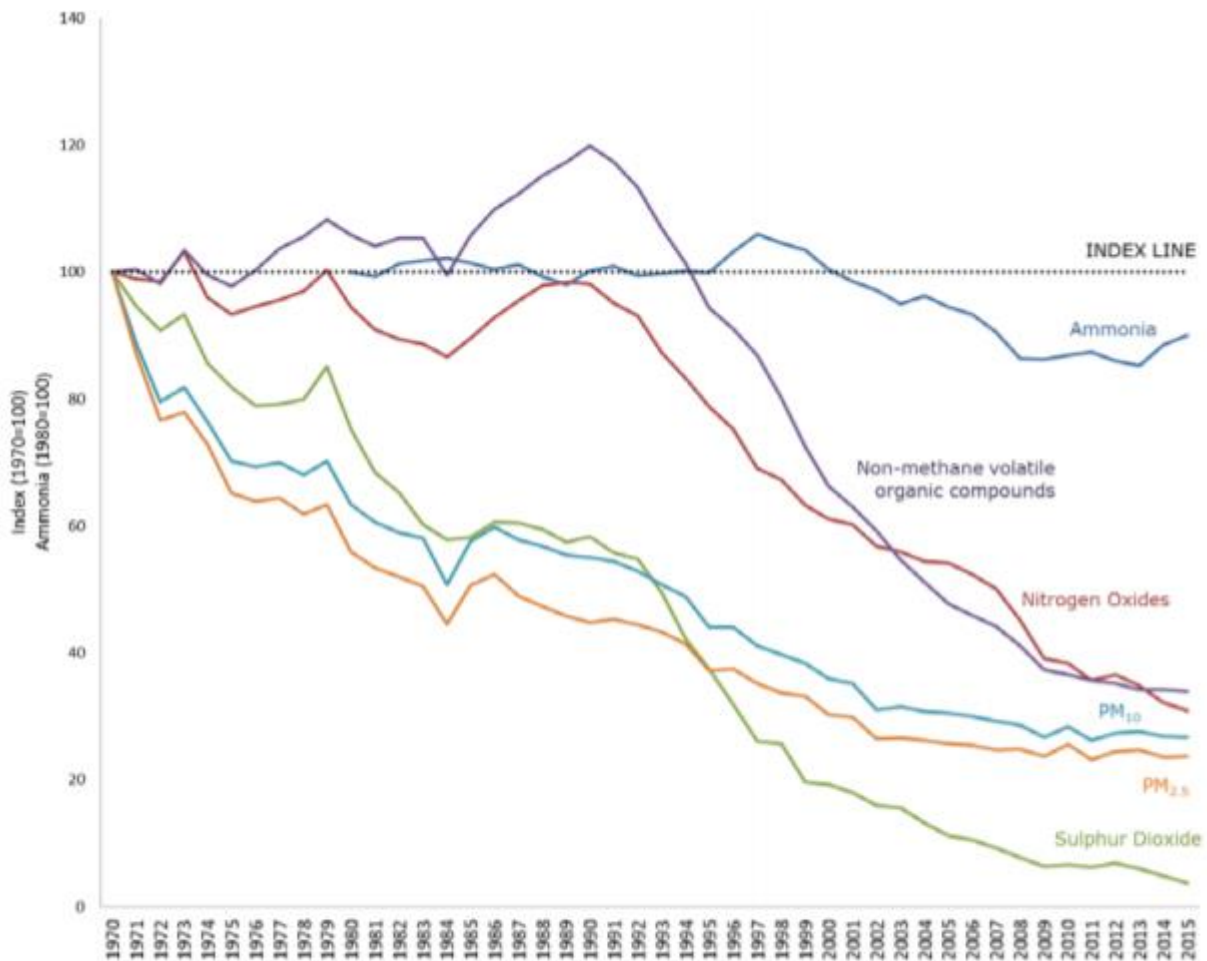
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<sup>275</sup> Department for Business, Energy and Industrial Strategy (2017) *UK Greenhouse Gas Inventory, 1990 – 2015*. Available online at: [https://uk-air.defra.gov.uk/assets/documents/reports/cat07/1705121352\\_ukghgi-90-15\\_Main\\_Issue2.pdf](https://uk-air.defra.gov.uk/assets/documents/reports/cat07/1705121352_ukghgi-90-15_Main_Issue2.pdf)

<sup>276</sup> Defra and the DfT (2017) *UK plan for tackling roadside nitrogen dioxide concentrations*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/633270/air-quality-plan-detail.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/633270/air-quality-plan-detail.pdf)

## Air Quality

Figure 8.2 UK air quality trend data.



The index line is a comparator that shows the level of emissions if they had remained constant from the beginning of the time series.

Source: Defra

Based on this trend data and in the context of increasingly restrictive legislation with regards to key sources of air pollution, such as from road transport and energy generation, it is reasonable to predict a continued improvement in air quality over time in accordance with the UK Informative Inventory Report (1990 to 2015)<sup>277</sup>.

## England

PM<sub>10</sub> pollution overall has been decreasing in recent years and this is predicted to continue in the future. By 2015, 71.7km of main urban road is predicted to be in exceedance of 31.5µg/m<sup>3</sup> (roughly equivalent to the Stage 1 PM<sub>10</sub> 24-hour limit value and objective), this is a 96.7% decrease compared to the 2003 baseline<sup>278</sup>.

<sup>277</sup> BEIS (2017) *UK Informative Inventory Report (1990 to 2015)*. Available online at:

[https://uk-air.defra.gov.uk/assets/documents/reports/cat07/1703161205\\_GB\\_IIR\\_2017\\_Final\\_v1.0.pdf](https://uk-air.defra.gov.uk/assets/documents/reports/cat07/1703161205_GB_IIR_2017_Final_v1.0.pdf)

<sup>278</sup> Defra (2007). *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland – Volume 2*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69337/pb12670-air-quality-strategy-vol2-070712.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69337/pb12670-air-quality-strategy-vol2-070712.pdf)

## Air Quality

Concentrations of NO<sub>2</sub> have been declining on average, although London Marylebone Road (the site with the highest NO<sub>2</sub> levels in England) and several other sites are showing increasing concentrations in the most recent years. Long-term trend data combined with increasingly restrictive emissions legislation for road transport would be expected to lead to an improvement in air quality in the long term.

### Scotland

There is an improving trend in air pollution in Scotland in recent years. For instance<sup>279</sup>:

- Scotland's NO<sub>x</sub> emissions have declined by 65% since 1990 and currently account for 9% of the UK total.
- Power generation is a very significant source of NO<sub>x</sub> emissions, accounting for 27% of the Scotland total in 2012.
- Scotland's PM<sub>10</sub> emissions have declined by 59% since 1990 and account for 10% of the UK total.
- At 37%, emissions from commercial, domestic and agricultural combustion were the main source of PM<sub>10</sub> in 2012.
- Emissions from power generation account for 25% of total emissions in 1990 but have significantly reduced to 8% in 2012. This has been primarily attributed to the move from coal fired to gas energy generation, which has negligible particulate matter emissions.

### Wales

In Wales (and the rest of the UK) the most widely exceeded limit value is for the annual mean NO<sub>2</sub> concentration (40 µg m<sup>-3</sup>). The mean for the long-running sites shows a slight decrease through the 2000s, although 2010 was a high year. Annual mean PM<sub>10</sub> concentrations have generally decreased in recent years, at both urban background and urban traffic sites. Ozone concentrations tended to be highest at rural locations, although there are no clear trends, concentrations vary considerably from year to year because of variation in metrological factors. Improvements in air quality are anticipated in the long term, mirroring trends elsewhere in the UK.

## 8.6 Assessing Significance

The objectives and guide questions related to air quality which have been identified for use in the appraisal of the effects of Water Resources NPS proposals are set out in **Table 8.1**, together with reasons for their selection.

**Table 8.1** Approach to Assessing the Effects of the Water Resources NPS on Air Quality

Objective/Guide Question	Reasoning
<b>Objective: To minimise emissions of pollutant gases and particulates and enhance air quality, helping to achieve the objectives of</b>	The SEA Directive (2001/42/EC) requires that likely significant effects on air quality be taken into account in the Environmental Report, which for the

<sup>279</sup> Scottish Government (2015) *Scottish Air Quality Database Annual Report 2014*. Available online at: [http://www.scottishairquality.co.uk/assets/documents/technical%20reports/SAQD\\_annual\\_report\\_2014\\_Issue\\_1.pdf](http://www.scottishairquality.co.uk/assets/documents/technical%20reports/SAQD_annual_report_2014_Issue_1.pdf)

## Air Quality

<b>the Air Quality and Ambient Air Quality and Cleaner Air for Europe Directives.</b>	<p>purposes of the AoS is incorporated within the AoS Report.</p> <p>Increases in transport movements and works associated with the construction and operation of nationally significant water resources infrastructure could affect air quality, particularly in areas with existing air quality issues. The inclusion of this AoS objective ensures that these effects can be considered within the AoS.</p>
Will the Water Resources NPS affect air quality?	The Ambient Air Quality and Cleaner Air for Europe Directive (2008/50/EC) aims to avoid the harmful effects on human health and the environment from air pollution and includes objectives and targets for ambient air quality. This is transposed into UK law by Air Quality Standards Regulations 2010.
Will the Water Resources NPS create a nuisance for people or wildlife (for example, from dust or odours)?	Emissions to air may create dust or odours that have the potential to affect air quality or to be classed as a statutory nuisance (as under Environmental Protection Act 1990).

**Table 8.2** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the air quality objective.

**Table 8.2** Illustrative Guidance for the Assessment of Significance for Air Quality

Effect	Description	Illustrative Guidance
++	Significant Positive	<ul style="list-style-type: none"> <li>Option would significantly improve local air quality through a sustained reduction in concentrations of pollutants identified in national air quality objectives.</li> </ul>
+	Positive	<ul style="list-style-type: none"> <li>Option would lead to a minor improvement in local air quality from a reduction in concentrations of pollutants identified in national air quality objectives.</li> </ul>
0	Neutral	<ul style="list-style-type: none"> <li>Option would not affect local air quality.</li> </ul>
-	Negative	<ul style="list-style-type: none"> <li>Option would result in a minor decrease in local air quality;</li> <li>Option would have a negative effect on local communities and biodiversity due to an increase in air and odour pollution and particulate deposition.</li> </ul>
--	Significant Negative	<ul style="list-style-type: none"> <li>Option would cause a significant decrease in local air quality (e.g. leading to an exceedance of Air Quality Objectives for designated pollutants and the designation of a new Air Quality Management Area);</li> <li>Option would have a strong and sustained negative effect on local communities and biodiversity due to significant increases in air and odour pollution and particulate deposition.</li> </ul>
?	Uncertain	<ul style="list-style-type: none"> <li>From the level of information available, the effect that the option would have on this objective is uncertain.</li> </ul>

## Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 8.3** presents the appraisal of the likely significant effects of the draft NPS and the 'no NPS' alternative on the air quality objective. The appraisal considers in-turn the three sub-sections used for each topic within



## Air Quality

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Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making and Mitigation. The performance of the draft NPS and the 'no NPS' alternative are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters 1 – 3 of the draft NPS outlining how the remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the 'no NPS' alternative is then summarised along with any proposed mitigation measures.

## Air Quality

Table 8.3 Appraisal of the Draft NPS and Reasonable Alternatives: Air

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	+	+/?	<p><b>Draft NPS:</b> In respect of air quality, the text in the draft NPS under 'Applicant's Assessment' states:</p> <p>4.2.4 "Where the air pollution impacts of the proposed development are likely to be significant, or cumulatively could lead to a breach of limit values set out in the Air Quality Standards Regulations 2010, the applicant must undertake an assessment of the impacts of the proposed development as part of the Environmental Statement."</p> <p>4.2.5 "Air quality considerations are likely to be particularly relevant where water resources infrastructure is proposed within or adjacent to Air Quality Management Areas (AQMAs) or any road links exceeding limit values according to Defra's assessments or where they may have potential impacts on Natura 2000 sites, including those outside England."</p> <p>4.2.6 "The Environmental Statement should describe:</p> <ul style="list-style-type: none"> <li>existing (background) air quality levels;</li> <li>any significant air quality effects, associated with the development (both alone and in-combination), their mitigation and any residual effects distinguishing between the project stages, and taking account of any significant emissions from any traffic generated by the project;</li> <li>the contribution of emissions to air, to site-specific critical levels and loads, for the protection of vegetation and ecosystems after mitigation methods have been applied; and</li> <li>the contribution of emissions to air to ambient air quality after mitigation methods have been applied."</li> </ul> <p>4.2.7 "Defra publishes future national projections of air quality based on estimates of future levels of emissions, traffic and vehicle fleet. Projections are updated as the evidence base changes. The applicant's assessment should be consistent with this, but may include more detailed modelling to demonstrate local impacts.."</p> <p>With regard to dust, odour, artificial light, smoke and steam, the draft NPS sets out:</p> <p>4.6.4 "Where the development is subject to an Environmental Impact Assessment, the applicant should assess any likely significant effects on amenity from emissions of dust, odour, artificial light, smoke and steam, and describe these in the environmental statement. In particular, the assessment provided by the applicant should describe:</p>

## Air Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><i>The type and quantity of emissions;</i></p> <ul style="list-style-type: none"> <li>• <i>Aspects of the development which may give rise to emissions during construction, operation and decommissioning;</i></li> <li>• <i>Premises or locations that may be affected by the emissions;</i></li> <li>• <i>Effects of the emission on identified premises or locations; and</i></li> <li>• <i>Measures to be employed in preventing or mitigating the emissions."</i></li> </ul> <p>4.6.5 <i>"The applicant is advised to consult the relevant local planning authority and, where appropriate, the Environment Agency, about the scope and methodology of the assessment."</i></p> <p>The requirement for significant effects on air quality (including dust, odour, smoke and steam) to be assessed as part of an ES and the associated guidance provided in draft NPS will help to ensure that adverse effects on air quality arising from the construction and operation of new water resources infrastructure are properly considered and mitigated where possible. Overall, this has been assessed as having a positive effect on air quality.</p> <p><u>Recommendations for Improvements</u></p> <p>It would be useful for the text in section 4.2 to make direct reference to the Planning Practice Guidance (PPG) on the level of suggested detail to be included within an air quality assessment as part of the ES (PPG Air quality, <i>How detailed does an air quality assessment need to be?</i>). Additionally, the text could make reference to other parts of the PPG, notably when air quality could be relevant to a planning decision (PPG Air Quality, <i>when could air quality be relevant to a planning decision?</i>). Direct reference to the PPG will also serve to substantiate links to the enhancement of air quality, helping to ensure that the applicant's assessment identifies such opportunities (which are further specified under 'Decision Making').</p> <p>The draft NPS could refer to the requirements of the Clean Air Strategy 2018, which sets out actions to improve air quality to improve public health, protect the environment and boost the economy.</p> <p>The text in the draft NPS mentions Natura 2000 sites (paragraph 4.2.5 refers) but does not set out the potential need for HRA and for air quality to be considered in a HRA, although the introduction does provide a cross reference to Section 4.3 (Biodiversity and Nature Conservation) of the draft NPS which in turn references the Conservation of Habitats and Species Regulations 2017. Reference could also be made to other designated nature conservation sites such as Sites of Special Scientific Interest (SSSI).</p> <p>Sections 4.2 and 4.6 of the draft NPS could recommend that early pre-application engagement is undertaken with, inter alia, the relevant local planning authority and the Environment Agency. This would help to inform the assessment methodology and validate the findings. Additionally, applicants could consider local air quality action plans and strategies, where relevant and appropriate.</p>

## Air Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>Specification of the contents of the ES could be drawn from the following which in turn serves as the reference point for the detail of the 'Decision Making' section:</p> <ul style="list-style-type: none"> <li>• Scoping <ul style="list-style-type: none"> <li>○ Identify the likely zone of influence of the proposed development.</li> <li>○ Evaluate existing (background) air quality levels.</li> <li>○ Describe any future anticipated changes to baseline conditions in the absence of the proposed project, to inform the assessment of impacts.</li> <li>○ Identify potentially sensitive receptors (whether local communities or nature conservation sites/habitats and species).</li> <li>○ Provide the basis for determining the significance of effects arising from the impacts including assessment methods and air quality model verification.</li> </ul> </li> <li>• Impact assessment <ul style="list-style-type: none"> <li>○ Assess any significant air quality effects (including in respect of odour, dust, smoke and steam) associated with the development and their mitigation, distinguishing between the project stages, and taking account of any significant emissions from any traffic generated by the project.</li> <li>○ Consider the contribution of air emissions to site-specific critical levels and loads, for the protection of vegetation and ecosystems.</li> <li>○ Consider the contribution of air emissions to ambient air quality.</li> </ul> </li> <li>• Avoidance, mitigation, compensation and enhancement <ul style="list-style-type: none"> <li>○ Identify and incorporate measures to avoid, reduce and compensate impacts on air quality.</li> <li>○ Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.</li> </ul> </li> </ul> <p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy, the EIA Regulations, HRA Regulations, Environmental Permitting Regulations, Air Quality Regulations and local air quality action plans. This would be expected to help ensure that adverse effects on air quality associated with new water resources infrastructure are identified, assessed and appropriately mitigated. Further, proposals would continue to be identified through the WRMP</p>

## Air Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>process which would include the consideration of effects on air quality. However, the absence of a clear statement on the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation and unintended consequences through implementation.</p> <p>Overall, this reasonable alternative is considered to have a positive effect on air quality, although some uncertainty remains.</p>
Decision Making	+	+/?	<p><b>Draft NPS:</b> The draft NPS sets out what the Secretary of State, as decision maker, must take into account when considering the effects of new water resources infrastructure on air quality. This includes: the consideration of AQMAs and their local air quality action plans; air quality impacts over a wider area than just that of the proposed development; and relevant air quality thresholds, including those set out in the Air Quality Standards Regulations 2010 and the Air Quality Directive (paragraphs 4.2.8 to 4.2.9). The draft NPS also sets out at paragraph 4.2.10 that where a proposed development is likely to lead to a breach of the air quality thresholds, the applicant should work with the relevant authorities to secure appropriate mitigation measures, with a view to ensuring, so far as is possible, that those thresholds are not breached. As such, it is expected that impacts on air quality would be minimised or mitigated where appropriate, in line with relevant legislation.</p> <p>Paragraph 4.2.12 of the draft NPS states that the Secretary of State should refuse consent where the air quality impacts of development will:</p> <ul style="list-style-type: none"> <li>result in a zone or agglomeration that is currently reported as being compliant with the limit values set out in Schedule 2 of the Air Quality Standards Regulations 2010 for the relevant averaging periods becoming non-compliant; or</li> <li>affect the ability of a non-compliant area to achieve compliance within the timescales set out in the most recent relevant air quality plan at the time of the decision.</li> </ul> <p>With regard to dust, odour, artificial light, smoke and steam, the draft NPS sets out:</p> <p>4.6.6 "The Secretary of State should be satisfied that all reasonable steps have been taken, and will be taken, to minimise any detrimental impact on amenity from emissions of dust, odour, artificial light, smoke and steam. This includes the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation."</p> <p>4.6.7 "If development consent is granted for a project, the Secretary of State should consider whether there is a justification for all of the authorised project (including any associated development) being covered by a defence of statutory authority against nuisance claims. If the Secretary of State cannot conclude that this is justified, then the defence should be disapplied, in whole or in part, through a provision in the development consent order."</p>

## Air Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>Overall, it is considered that the draft NPS is likely to make a positive contribution to this AoS objective by setting out a range of factors to be considered in determining an application including the circumstances in which an application should be refused.</p> <p><b>No NPS:</b> Applications would be subject to the provisions of national planning policy, EIA Regulations, HRA Regulations and the Air Quality Regulations under this alternative which would be considered to have a positive, albeit uncertain, effect against the air quality assessment objective. The uncertain effects arise from the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation and unintended consequences through implementation.</p>
Mitigation	+	+/?	<p><b>Draft NPS:</b> The text in the draft NPS under 'Mitigation' (section 4.2) states:</p> <p>4.2.13 <i>"The Secretary of State should be satisfied that the mitigation measures put forward by the applicant, and which are needed in respect of both construction and operational emissions, are acceptable. A construction management plan, adequately secured through for example a DCO requirement, will help provide mitigation measures (such as air quality monitoring, dust suppression plans, containment, limiting times of activity and ensuring an adequate distance between sources of emissions and receptors)."</i></p> <p>4.2.14 <i>"In considering proposed mitigation measures, the Secretary of State may refer to the conditions and advice in any relevant air quality plan."</i></p> <p>4.2.15 <i>"Reductions in air emissions might be achieved through consideration of design and layout; the technologies employed; and energy use."</i></p> <p>Additionally, the introductory section identifies the following mitigation measures:</p> <ul style="list-style-type: none"> <li>• HGV movements and construction vehicles should be routed and timed to avoid peak traffic periods and sensitive receptors.</li> <li>• Use of best practice methods including the development and implementation of Construction Environmental Management Plans (CEMP) should be considered.</li> <li>• Dust suppression measures should be utilised during construction.</li> <li>• Air quality monitoring should be undertaken where appropriate.</li> <li>• Where possible, lower emissions plant and vehicles should be used.</li> </ul>

## Air Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>Detailed air quality and transport assessments should be undertaken as required.</li> </ul> <p>With regard to dust, odour, artificial light, smoke and steam, the draft NPS sets out:</p> <p>4.6.8 <i>"The Secretary of State should ensure the applicant has provided sufficient information to show that any necessary mitigation will be put into place. In particular, the Secretary of State should consider whether to require the applicant to abide by a scheme of management and mitigation concerning emissions of dust, odour, artificial light, smoke and steam from the development to reduce any loss to amenity which might arise during the construction and operation of the development. A construction management plan may help clarify and secure mitigation."</i></p> <p>Overall, it is considered that the draft NPS makes a positive contribution to this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>To inform the appraisal of sections 4.2 and 4.6 of the draft NPS, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on air quality has been undertaken. This review is intended to help identify where any additional measures could be included in the draft NPS (in the introduction or mitigation section of the topic) to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p> <p>The following text identifies the anticipated air quality impacts and associated mitigation measures. These have been largely identified within the draft NPS and are discussed again here to ensure that the description of impacts is clear and provides the necessary context for the recommended mitigation measures. Where impacts discussed here have not been included within the draft NPS, they have been clearly identified.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p> <p><i>Construction</i></p> <p>As identified in the draft NPS, emissions to air from vehicle movements and the use of plant associated with the construction of new or enlarged reservoirs could affect air quality. This is a particular issue in areas with existing air quality issues and/or where sites are located in close proximity to sensitive receptors. There is also the potential for impacts on local communities and/or biodiversity from the generation of dust during construction.</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, there are expected to be a number of vehicle movements associated with the ongoing operation of reservoirs. It is considered that the number of movements would be low and emissions to air would be expected to be minimal, with the anticipated impacts regarding air quality expected to be low.</p> <p><b>Water Transfer Schemes</b></p>

## Air Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><i>Construction</i></p> <p>As per the construction impacts for reservoirs.</p> <p><i>Operation</i></p> <p>There are not expected to be any substantial effects in relation to air quality during the operation of water transfer schemes.</p> <p><b>Desalination</b></p> <p><i>Construction</i></p> <p>As per the construction impacts for reservoirs.</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, there will be a moderate number of vehicle movements and associated emissions to air during the operation of a desalination plant (e.g. deliveries, workers and maintenance vehicles), although any impacts on local air quality are likely to be minor. There will also be operational effects associated with the process of desalination and pumping water, particularly from stack emissions.</p> <p><b>Potential additional mitigation measures identified through a review draft WRMPs and their associated SEA Environmental Reports include:</b></p> <ul style="list-style-type: none"> <li>• Where possible, development should be sited away designated AQMAs.</li> </ul>
			<p><b>No NPS:</b> Under this alternative, appropriate mitigation measures would be considered by the relevant authority in light of the proposals submitted. As such, mitigation measures would be forthcoming but there is the risk that they are not comprehensive or consistent (without the direction and guidance given in the draft NPS) and so will not fully address any effects arising or could be accompanied by greater uncertainty.</p>
<b>Other Sections of the Draft NPS Relevant to Air</b>	<p>The following provides additional commentary on the text in the other sections of the draft NPS relevant to air quality. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b><u>1. Introduction</u></b></p> <p><b>1.1. Background and scope of this NPS</b> – reference to the AoS prepared in support of the draft NPS will help to ensure that the effects on air quality are given proper consideration, notwithstanding the fact that there remains uncertainty over potential impacts, particularly in respect of the absence of specific locations and likely effects within the draft NPS.</p>		



## Air Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>With regard to para 1.1.8 There is an opportunity for the consideration of effects on air quality in a specific locality through the preparation of a local impact report submitted by a local authority in accordance with the Planning Act 2008. There is no prescribed format for local impact reports but there is clearly an opportunity for a local authority to comment on relevant issues, helping to ensure that consideration is given to likely effects in a particular locality.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on air quality in Scotland and Wales.</p> <p><b>1.3. Infrastructure covered by the Water Resources NPS</b> – as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on air quality.</p> <p><b><u>2. Government policy and the need for water resources infrastructure</u></b></p> <p><b>2.6 The need for new water resources infrastructure projects</b> –the section identifies that alongside reservoirs, water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP, when assessed against the relevant threshold in the Planning Act 2008 or through a section 35 referral. These infrastructure types may have air quality impacts of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p> <p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p><b><u>3. Assessment Principles</u></b></p> <p><b>3.1 General principles of assessment</b> - the provisions of the Planning Act 2008 and the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, provides the starting point for the protection and enhancement of air quality.</p> <p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on air quality.</p> <p><b>3.2 Environmental Impact Assessment</b> – the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that effect on air quality are fully considered, as will the consideration of cumulative effects and interrelationships between effects.</p> <p>This section specifically highlights that information gathered from the WRMP options assessments and the draft NPS will also be useful to identify the significant effects of a proposed project.</p> <p><b>3.3 Habitats Regulations Assessment</b> – suggests that applicants refer to later sections of the draft NPS (including on biodiversity, land use, and air quality) when undertaking a HRA which could be expected to reduce potential adverse effects on Natura 2000 sites.</p>

## Air Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>3.5 Assessing Alternatives</b> – the requirement that reasonable alternatives will need to be considered as part of scheme design and project planning, including as part of the WRMP options appraisal process, should ensure that air quality related issues are taken into account, both in terms of protection and opportunities for mitigation and enhancement.</p> <p><b>3.6 Criteria for ‘good design’ for water resources infrastructure</b> – no direct relationship.</p> <p><b>3.7 Climate Change Adaptation</b> – when considering a proposal, the Secretary of State should take the effects of climate change into account. Whilst the UK Government is taking measures to mitigate the effects of climate change and reducing emissions, including reducing and mitigating against adverse effects and impacts against air quality, the Intergovernmental Panel on Climate Change (IPCC) estimate that warming will continue over the anticipated lifetime of new water resources infrastructure.</p> <p><b>3.8 Environmental Regulation</b> – issues relating to discharges or emissions from a proposed infrastructure project which affect, inter alia, air quality will be subject to separate regulation under the pollution control framework or other consenting or licensing regimes. Any activities within the development that are regulated under those regimes will need to obtain the relevant permissions before the activities can be undertaken. The various planning and pollution control systems will act to protect air quality, particularly where these are to be considered as part of the judgement on whether the development is an acceptable use of the land. Pollution control is concerned with preventing pollution through the use of measures, such as environmental permits, to prohibit or limit the release of substances to the environment from different sources, to the lowest practicable level. Environmental permits cannot control impacts from sources outside the scheme’s boundary such as those from traffic movements and associated emissions.</p> <p><b>3.9 Common Law Nuisance and Statutory Nuisance</b> – during examination, possible sources of nuisance under Section 79(1) of the Environmental Protection Act 1990 and how they may be mitigated or limited is considered by the Examining Authority. This will enable the Examining Authority to recommend appropriate requirements that the Secretary of State may wish to include in any subsequent order granting development consent. Possible sources of nuisance under the 1990 Act include, inter alia:</p> <ul style="list-style-type: none"> <li>• smoke emitted from premises so as to be prejudicial to health or a nuisance;</li> <li>• fumes or gases emitted from premises so as to be prejudicial to health or a nuisance; and</li> <li>• any dust, steam, smell or other effluvia arising on industrial, trade or business premises and being prejudicial to health or a nuisance.</li> </ul> <p><b>3.10 Safety</b> – no direct relationship identified.</p> <p><b>3.11. Security Considerations</b> – no direct relationship identified.</p> <p><b>3.12 Health</b> – notes that where the proposed development has an effect on health, the ES should assess these effects for each element of the project, including in respect of air quality, identifying any adverse health impacts and mitigation measures to avoid, reduce or compensate for such impacts as appropriate.</p>

## Air Quality

Draft NPS Section	Draft NPS	No NPS	Appraisal
Summary Appraisal of Likely Significant Effects	+	+/?	<b>Draft NPS:</b> The development of new water resources infrastructure can be expected to involve emissions to air which could lead to adverse impacts on human health as well as biodiversity. Sources of potential emissions to air include emissions from vehicle movements, construction plant, generator and dust generated during construction. Air quality standards and objectives are governed by European and domestic legislation; where impacts of a project are expected to affect the UK’s ability to meet the targets laid out in legislation, or result in significant negative effects on air quality in accordance with the EIA Regulations, the draft NPS sets out that the applicant must undertake an assessment of the impacts as part of the ES. The Secretary of State, as decision maker, must consider air quality impacts over an area wider than that of the development site (including, where applicable, effects in Wales and Scotland) and work with the applicant and relevant authorities to secure appropriate mitigation measures where a project is likely to lead to a breach of air quality thresholds. The Secretary of State must ensure that mitigation measures are satisfactory and can refuse consent where, following consideration of mitigation measures, either development may result in non-compliance with the Air Quality Directive or it may affect the ability of a non-compliant area to become compliant.  The draft NPS highlights the broad range of air quality issues that will need to be considered and identifies threshold where development would be refused. This has been assessed as having an overall positive effect on this AoS objective.
			<b>No NPS:</b> Despite the absence of a guiding framework for air quality impacts, this alternative is likely to result in positive effects on this AoS objective overall as any development would be subject to the provisions of, inter alia, national planning policy, the EIA Regulations, HRA Regulations and Air Quality Regulations. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on air quality. However, the absence of clear expectations relating to the scope of assessment (including mitigation and enhancement) could lead to uncertainty and inconsistency in their application and missed opportunities to minimise emissions to air. The precise range of mitigation applied as part of any scheme development would potentially be less certain and with greater inconsistency than under a NPS.
Summary of Recommended Mitigation and Enhancement	The draft NPS makes a positive contribution to this AoS objective. However, section 4.3 of the draft NPS could be enhanced through, in particular: <ul style="list-style-type: none"><li>strengthening of the linkages to the NPPF, PPG and the Clean Air Strategy 2018, as well as local air quality actions plans and strategies;</li><li>inclusion of reference to air quality impacts on biodiversity;</li><li>recommending early pre-application engagement with relevant bodies;</li><li>provision of further guidance on the possible contents of an ES.</li></ul>		

**Air Quality**

Draft NPS Section	Draft NPS	No NPS	Appraisal
	It is considered that the draft NPS has identified a range of appropriate mitigation measures. However, reference could usefully be made to the need to ensure that development is sited away from designated AQMAs.		

## Noise

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# 9. Noise

## 9.1 Introduction

This section presents the overview of plans and programmes and baseline information for the appraisal of sustainability of the National Policy Statement for Water Resources in respect of noise.

Noise in an environmental context is defined as unwanted sound. Emissions of noise may arise during construction, operation and decommissioning of development and could affect human and ecological receptors.

There are links between the noise topic and other topics in the Appraisal of Sustainability (AoS), specifically human health, biodiversity and nature conservation and landscape.

## 9.2 Review of Plans and Programmes

The policies seek to manage both ambient noise and noise emitting from a particular point source. Whilst water resource infrastructure is not typically associated with high levels of noise once operational, the policies provide the framework to manage potentially high levels of noise during the construction phase of any infrastructure, both on site and noise associated with transport movements

### International

The World Health Organisation's (WHO) **Guidelines for Community Noise 1999** notes that in comparison to many other environmental problems, noise pollution levels continue to increase rather than reduce, coupled with an increasing number of complaints from affected individuals. The document states that 'Noise is likely to continue as a major issue well into the next century'. WHO research has identified noise exposure levels within the population that are considered to have harmful effects on human health. Based on this research, the WHO has developed a number of recommended noise levels that should prevent adverse health effects. This document is widely referenced in the field of acoustics; however, it has not been adopted into any subsequent guidelines or UK regulation. The WHO's **Night Noise Guidelines for Europe (2009)**, meanwhile, seeks to avoid health impacts from exposure to noise during sleep.

The **Environmental Noise Directive (END) (2002/49/EC)** is concerned with noise from road, rail, air traffic and industry. The level of exposure to environmental noise has been determined through noise mapping to which it has been proposed will give rise to noise action plans. The four sets of **Environmental Noise Regulations 2006** (SI 2006/2238 in England; WSI 2006/2629 in Wales; SSI 2006/465 in Scotland; and NSIR 2006/387 in Northern Ireland), address the requirements of END to inform the production of noise action plans for large urban areas (END agglomerations), major transport sources, and significant industrial sites. The action plans are intended to manage noise issues and effects to ensure the noise environment is preserved or noise levels are reduced where possible. The first noise maps were completed in 2007 and updated in 2012.

### UK

The **Environmental Protection Act (1990)** defines the legal framework with England, Scotland and Wales for duty of care for waste, contaminated land and statutory nuisance (including noise emitted from Premises be

## Noise

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prejudicial to health or a nuisance). Further provisions with respect to noise (as well as waste disposal, water pollution, atmospheric pollution and public health) are set out in the **Control of Pollution Act 1974**. Noise, litter and waste controls are introduced in the **Clean Neighbourhoods and Environment Act 2005**.

The **Control of Noise at Work Regulations 2005 (the Noise Regulations)** (SI 2005/1643) aims to ensure that workers' hearing is protected from excessive noise at their place of work, which could cause them to lose their hearing and/or to suffer from tinnitus.

The Institute of Environmental Management and Assessment (IEMA) / Institute of Acoustics (IoA) document Updated **Guidelines for Noise Impact Assessment** were published in October 2014. The guidelines are applicable to noise impact assessment for any scale of development proposal.

The British Standards Institution (BSI) document **BS 8233: 2014 - Sound Insulation and Noise Reduction for Buildings – Code of Practice** gives recommendations for the control of noise in and around buildings, and suggests appropriate criteria and limits for different situations. The code is primarily intended to guide the design of new or refurbished buildings, but it does provide a source of noise levels for common situations, such as typical traffic noise levels at the facades of buildings.

The BSI document **BS 5228-1: 2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites** gives recommendations for basic methods of noise control relating to construction and open sites where work/activities generate significant noise levels. Part 1 provides guidance concerning methods of predicting and measuring noise and assessing its effects. Part 2 provides guidance concerning methods of predicting and measuring vibration and assessing its effects.

## England

The **National Planning Policy Framework (MHCLG, 2018)** sets out the core land use planning principles that should underpin both plan-making and decision taking. The Framework expects the planning system to prevent "both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of, [inter alia] noise pollution".

In addition, paragraph 180 of the NPPF provides that planning policies and decisions should ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development.; In doing so they should mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life; identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation. .

The noise section of the **Planning Practice Guidance** provides advice regarding the consideration of potential noise impacts in planning decisions.

**Noise Policy Statement for England (Defra, 2010)** sets out the long-term vision of Government noise policy which seeks to promote good health and quality of life through the effective management of noise within the framework of Government policy on sustainable development.

In accordance with the Environmental Noise (England) Regulations 2006, Defra has prepared a Noise Action Plan, designed to address the management of noise issues and effects from roads and railways in the 65 agglomeration areas in England. The Action Plan is underpinned by the results of a second strategic mapping exercise.

## Noise

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### Scotland

The ***Environmental Noise (Scotland) Regulations 2006*** (SSI 2006/465) requires that Scottish ministers must prepare Strategic Noise Maps and Noise Action Plans which identify Quiet Areas and areas where management of noise is required. The Scottish Government identifies such areas as Noise Management Areas (NMAs).

In accordance with the Regulations, action plans have been prepared (and in some cases prepared and subsequently updated) for:

- Edinburgh Agglomeration;
- Glasgow Agglomeration;
- Dundee Agglomeration;
- Aberdeen Agglomeration;
- Transportation;
- Aberdeen Airport;
- Edinburgh Airport; and
- Glasgow Airport.

The ***Scottish Planning Policy (SPP) (2014)*** stresses the role of noise impact assessments in developments where noise is likely to be considerable and emphasises the need for mitigation where noise is likely to require some form of control.

***Planning Advice Note 1/2011 (PAN) Planning and Noise (2011)*** provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise.

### Wales

The ***Wales Spatial Plan Update (2008)*** recognises the work of multiple organisations in helping to promote shared learning and the development a medium-term strategy for the sustainable development of Wales. The Update is in keeping with the One Wales, One Planet principles published in 2008 and provides the context and direction of travel for local development plans and the work of local service boards. The key themes of the update are:

- building sustainable communities;
- promoting a sustainable economy;
- valuing our environment;
- achieving sustainable accessibility; and
- respecting distinctiveness.

***Planning Policy Wales (9th: Chapter 13 – Minimising and Managing Environmental Risks and Pollution (2016)*** sets the Welsh Government's objectives to maximise environmental protection for people, prevent or manage pollution and promote good environmental practice.

***Technical Advice Note (TAN) 11: Noise (1997)*** sets out the Welsh Government's land use planning policy in respect of noise generating development, noise-sensitive development and measures to mitigate the

## Noise

impact of noise. It sets out that local planning authorities must ensure that noise generating development does not cause an unacceptable degree of disturbance. They should also bear in mind that if subsequent intensification or change of use results in greater intrusion, consideration should be given to the use of appropriate conditions.

### 9.3 Overview of the Baseline

#### UK

Noise and vibration are predominantly local in nature and difficult to measure on a regional or national scale.

**The National Noise Attitude Survey 2012 – NO0237 (December 2014)**<sup>280</sup> was undertaken to:

- provide the Government with a good estimate of current attitudes to various aspects of environmental, neighbour and neighbourhood noise (including the percentage of the population affected); and
- allow the Government to detect any substantive changes in attitudes to noise in the UK since the 2000 survey.

A summary of findings revealed that 72% of respondents reported general satisfaction with their noise environment. However, between 2000 and 2012 there was an increase of between 11% and 17% (depending on the noise source) in the proportion of people surveyed who felt that they were to some extent adversely affected by the four most commonly heard sources of noise ('road traffic', 'neighbours and/or other people nearby', 'aircraft, airports and airfields' and 'building, construction, demolition, renovation and road works'). Also in the same period, there was a decrease of between 10% and 16% (depending on the noise source) in the proportion of people surveyed who felt that they were not at all adversely affected by the four most commonly heard sources of noise.

The survey also found that the proportion of those reporting themselves as being significantly adversely affected by noise had remained broadly the same since 2000, i.e. the proportion of those experiencing potentially significant adverse effects had not worsened. The number reporting hearing the four most commonly heard sources of noise had also remained broadly the same. In general, 48% of respondents said that their home life was spoilt to some extent by noise, with 52% reporting that noise did "not at all" spoil their home life.

#### England

**Figure 9.1** below shows the proportion of people making noise complaints in England, as reported within the last published edition of the Office for National Statistics Sustainable Development Indicators publication<sup>281</sup> (note that this is no longer published, but data for the indicators is still available from its original source).

<sup>280</sup> Defra (2014) *The National Noise Attitude Survey 2012 – NO0237*. Available online at:

<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=18288>

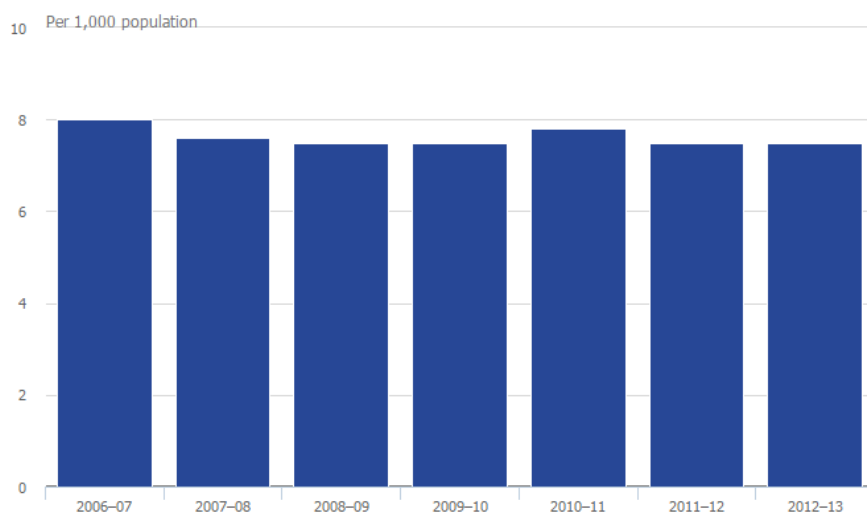
<sup>281</sup> Office for National Statistics (2015) *Sustainable Development Indicators - Figure 20.1: Noise complaints per 1,000 population, 2006-07 to 2012-13*. Available online at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/articles/sustainabledevelopmentindicators/2015-07-13->



## Noise

Figure 9.1 Noise complaints per 1,000 population



Source: Office for National Statistics.

Under the terms of the END, Defra has prepared a Noise Action Plan; underpinned by the results of a strategic mapping exercise<sup>282</sup>. They indicate that road traffic is the most dominant noise exposure source.

The estimated number of people in agglomerations above noise level  $L_{den}$  due to noise from roads is shown in **Table 9.1**.

Table 9.1 Estimated number of people in agglomerations above various noise levels due to noise from roads,  $L_{den}$

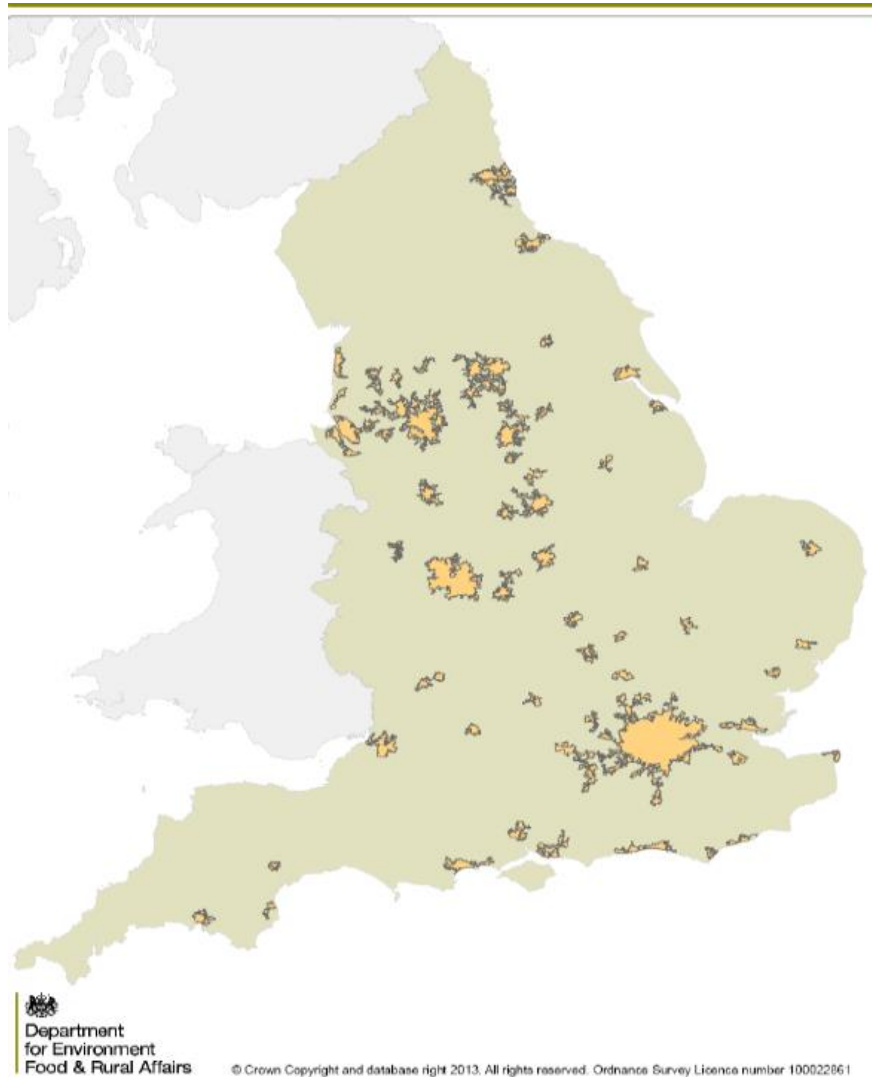
Noise Level ( $L_{den}$ ) (dB)	Number of People
≥55	7,401,000
≥60	3,717,000
≥65	2,325,000
≥70	1,122,000
≥75	135,000

Defra has identified a number of "Important Areas" or "noise hotspots" through the strategic mapping. It has been estimated that the number of people immediately associated with the Important Areas identified for roads inside agglomerations is just over 119,000.

<sup>282</sup> Extrium (2017) *England noise map viewer*. Available online at: <http://www.extrium.co.uk/noiseviewer.html>

## Noise

Figure 9.2 Map showing the approximate location of END agglomerations



The Campaign to Protect Rural England have published a **tranquillity map** for England<sup>283</sup>.

## Scotland

Interactive noise maps can be generated from the Scottish Government's Scottish Noise Mapping facility<sup>284</sup>. They indicate that road traffic is the most dominant noise exposure source.

Agglomerations have been mapped for the urban areas of Edinburgh, Glasgow, Aberdeen and Dundee. The number of people exposed to noise levels above  $L_{den}$  is 991,200.

<sup>283</sup> CPRE (2007) *Tranquillity Map: England*. Available online at: <http://www.cpre.org.uk/resources/countryside/tranquil-places/item/1839>

<sup>284</sup> Scottish Government (2017) *Welcome to Scotland's noise*. Available online at: <http://www.scottishnoisemapping.org/>

## Noise

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### Wales

Interactive noise maps showing estimated levels of road traffic, railway and industrial noise in Wales' three largest urban areas, and noise from the busiest roads and railways across Wales are available via the Welsh Government's website<sup>285</sup>. Based on these maps a total of 220 priority areas for road noise and 27 for railway noise have been identified<sup>286</sup>.

## 9.4 Summary of Existing Problems Relevant to the Water Resources NPS

The following existing problems for noise have been identified:

- Ambient noise levels are gradually rising in the UK as a result of an increasing - and increasingly mobile - population. This, in turn, increases the value of tranquil places. The cumulative impacts of noise on sensitive groups in local communities may create or exacerbate existing health issues.
- Road traffic is a dominant source of noise.
- There is a need to address noise issues in the UK's most affected communities.
- Noise from the construction and operation of the water resources infrastructure will need to be assessed and where possible reduced or mitigated through guidance in the NPS.

## 9.5 Likely Evolution of the Baseline

It is difficult to quantify the likely evolution of noise in UK (and for England, Scotland and Wales) although it seems likely that new development will result in increases in noise levels and could thereby negatively affect people's health and the environment (e.g. disturbance to biodiversity, decreased enjoyment of the countryside). However, the Environmental Noise Regulations and associated action plans may result in the reduction of noise in priority areas over time. The most recent trend data in **Figure 8.1** would suggest that levels of noise complaints have remained stable for the most recent 10 years' worth of data.

It needs to be recognised that as the effects of noise are felt at the local level, it is possible that even if noise levels in the UK as a whole increase or decrease, there is the potential that at the local level noise could improve or get worse as a result of an individual development (for example, if a quieter process replaces existing development). The noise from transport could also decline in the future due to quieter technology being employed in cars, buses and aeroplanes, although if the overall volume of traffic increases this could result in increased noise levels.

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<sup>285</sup> Welsh Government (2017) *Wales Noise Mapping*. Available online at: <http://data.wales.gov.uk/apps/noise/>

<sup>286</sup> Welsh Government (2014) *Noise areas*. Available online at: <http://gov.wales/topics/environmentcountryside/epg/noiseandnuisance/environmentalnoise/noisemonitoringmapping/priority-areas/?lang=en>

## Noise

## 9.6 Assessing Significance

The objectives and guide questions related to noise (and vibration) which have been identified for use in the appraisal of the effects of Water Resources NPS proposals are set out in **Table 9.2** together with reasons for their selection.

Table 9.2 Approach to Assessing the Effects of the Water Resources NPS on Noise

Objective/Guide Question	Reasoning
<b>Objective: To minimise noise pollution and the effects of vibration.</b>	EU and UK policy on noise management and reduction guides the preparation of strategies at the UK and local levels to avoid and limit what is a pollutant. The construction and operation of water resources infrastructure is likely to have noise impacts associated with vehicle movements and the operation of plant and machinery. As such, the issues are important to the AoS Report in respect of human health, in particular.
Will the Water Resources NPS help to minimise noise and vibration effects from construction and operational activities on residential amenity and on sensitive locations and receptors?	The impacts of noise pollution and from vibration on specific localities will need careful consideration in all phases of any project associated with the development of new water infrastructure. This could include local strategies based on general principles and practical measures for noise and vibration avoidance and limitation.

**Table 9.3** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the noise objective.

Table 9.3 Illustrative Guidance for the Assessment of Significance for Noise

Effect	Description	Illustrative Guidance
++	Significant Positive	<ul style="list-style-type: none"> <li>Option would significantly improve the ambient noise environment in the vicinity of potential or actual sites.</li> </ul>
+	Positive	<ul style="list-style-type: none"> <li>Option would lead to an improvement in the ambient noise environment in the vicinity of potential or actual sites.</li> </ul>
0	Neutral	<ul style="list-style-type: none"> <li>Option would not affect the noise environment of potential or actual sites.</li> </ul>
-	Negative	<ul style="list-style-type: none"> <li>Option would result in a minor negative effect on the ambient noise environment in the vicinity of potential or actual sites;</li> <li>Option would cause minor disturbance associated with vibration on potential or actual sites.</li> </ul>
--	Significant Negative	<ul style="list-style-type: none"> <li>Option would result in a major negative effect on the ambient noise environment in the vicinity of potential or actual sites over the short or longer term;</li> <li>Option would cause major disturbance associated with vibration on potential or actual sites over the short or longer term.</li> </ul>
?	Uncertain	<ul style="list-style-type: none"> <li>From the level of information available, the effect that the option would have on this objective is uncertain.</li> </ul>

## Noise

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### Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 9.4** presents the appraisal of the likely significant effects of the draft NPS and the 'no NPS' alternative on the noise objective. The appraisal considers in-turn the three sub-sections used for each topic within Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making and Mitigation. The performance of the draft NPS and the 'no NPS' alternative are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters 1 – 3 of the draft NPS outlining how the remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the 'no NPS' alternative is then summarised along with any proposed mitigation measures.

## Noise

Table 9.4 Appraisal of the Draft NPS and Reasonable Alternatives: Noise

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	+	+/?	<p><b>Draft NPS:</b> The text in the draft NPS under 'Applicant's Assessment' states:</p> <p>4.11.3. "Where noise impacts are likely to arise from water resources infrastructure, the applicant should include a noise assessment as part of the Environmental Statement. That noise assessment should include:</p> <ul style="list-style-type: none"> <li>• "a description of the noise-generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise;</li> <li>• identification of noise-sensitive premises and noise-sensitive areas that may be affected;</li> <li>• the characteristics of the existing noise environment;</li> <li>• a prediction of how the noise environment will change with the proposed development: <ul style="list-style-type: none"> <li>○ in the shorter term, such as during the construction period;</li> <li>○ in the longer term, during the operating life of the infrastructure; and</li> <li>○ at particular times of the day, evening and night (and weekends) as appropriate, and at different times of year.</li> </ul> </li> <li>• an assessment of the effect of predicted changes in the noise environment on any noise-sensitive premises and noise-sensitive areas;</li> <li>• if likely to cause disturbance, an assessment of the effect of underwater or subterranean noise; and</li> <li>• measures to be employed in mitigating the effects of noise. Applicants should consider using best available techniques to reduce noise impacts."</li> </ul> <p>Alongside guidance on the scope of an Environmental Statement (ES), the draft NPS also sets out that the nature and extent of the noise assessment should be proportionate to the likely noise impact. Similarly, the potential noise impact of ancillary activities associated with development, such as increased road and rail traffic movements or other forms of transportation, should also be considered, as appropriate. The text draws attention to how, with respect to human receptors, operational noise and the prediction, assessment and management of construction noise should be assessed using references to the relevant British Standards and other guidance. The draft NPS advises that the applicant consults the relevant authority on the</p>

## Noise

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>likely scope of an ES and Natural England with regard to the assessment of noise aspects on protected species or other wildlife.</p> <p>The requirement for the preparation of an ES with regards to noise and the provision of associated guidance will help to ensure that effects associated with the construction and operation of new water resources infrastructure are properly considered and appropriate mitigation measures are identified. Overall, it is considered that there are likely to be positive effects on this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>Reference could usefully be made in this section to the need for applicants to undertake early consultation and engagement with the relevant local authority.</p> <p>The draft NPS could include further detailed guidance on the potential contents that should form part of the ES. Specification of the contents of the ES could be drawn from the following, which in turn serves as the reference point for the detail of the 'Decision Making' section:</p> <ul style="list-style-type: none"> <li>• Scoping <ul style="list-style-type: none"> <li>○ With reference to the guidance identified, outline what constitutes a significant impact with regard to noise.</li> <li>○ Identify and evaluate any potentially significant sources of noise for both the construction and operational phases of development.</li> <li>○ Identify and evaluate any noise sensitive receptors in the vicinity of the proposed infrastructure, including residents, businesses and tranquil areas (including those parts of the community that could be particularly affected and/or disrupted by noise and those European and nationally designated nature conservation sites).</li> <li>○ Describe any future anticipated changes to the above in the absence of the proposed infrastructure, to inform the assessment of impacts.</li> <li>○ Provide the methodological basis for determining significance of effects and the scope of effects to be assessed.</li> </ul> </li> <li>• Impact Assessment <ul style="list-style-type: none"> <li>○ Assess and characterise the impacts and their effects (including scale, duration and significance).</li> <li>○ With reference to the characteristics of the development and the receiving environment, include:</li> </ul> </li> </ul>

## Noise

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>▪ a map showing the site and surrounding area including receptors;</li> <li>▪ an estimate, by type and quantity, of expected noise resulting from the construction and operation of the proposed infrastructure.</li> <li>○ If a BS4142 assessment is carried out, provide a full noise survey report (see BS4142 'Information to be reported').</li> <li>○ Assess whether, post mitigation, there are any residual effects that would still be considered significant.</li> <li>• Avoidance, mitigation, compensation and enhancement <ul style="list-style-type: none"> <li>○ Identify and incorporate measures to avoid, reduce and compensate for noise impacts, and where possible enhance beneficial effects.</li> <li>○ Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.</li> </ul> </li> </ul>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy, the EIA Regulations, WHO guidance (e.g. Guidelines for Community Noise 1999) and relevant British Standards (e.g. BS 5228-1: 2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites +A1:2014). This would be expected to help ensure that adverse effects on noise associated with new water resources infrastructure are identified, assessed and appropriately mitigated. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on noise.</p> <p>Overall, this reasonable alternative is considered to have a positive effect on noise, although some uncertainty remains.</p>
<b>Decision Making</b>	+	+/?	<p><b>Draft NPS:</b> This section sets out that it is expected that the development of new water resources infrastructure will be undertaken in accordance with the relevant statutory requirements for noise and that due regard should be given to the relevant sections of the Noise Policy Statement for England, the NPPF and the PPG on noise.</p> <p>The draft NPS expects development to demonstrate good design through, for example, the selection of the quietest cost-effective approach available. Within the context of Government policy on sustainable development, the Secretary of State, as decision maker, should not grant consent unless satisfied that a proposal will: avoid significant adverse impacts on health and</p>



## Noise

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>quality of life from noise as a result of new development; mitigate and minimise other adverse impacts on health and quality of life from noise from new development; and where possible, contribute to improvements to health and quality of life.</p> <p>When determining applications, this section stipulates that the Secretary of State should consider whether mitigation measures are needed both for construction noise and operational noise. The Secretary of State may wish to impose requirements to ensure delivery of all mitigation measures. This is to ensure that the noise levels from development do not exceed those described in the assessment or any other estimates on which the decision was based.</p> <p>For those processes in a development whose noise aspects would be subject to an environmental permitting regime, the Secretary of State may assume that the regime will exercise the necessary controls over noise impacts. However, the Secretary of State must take into account the potential impact from all noise sources when deciding whether or not to grant development consent and, if so, on what terms.</p> <p>Overall, it is considered that sufficient information is provided in the draft NPS to enable the Secretary of State to make an informed decision and have sufficient confidence that any adverse effects arising from noise from a proposed development will be adequately minimised and/or mitigated.</p> <p><u>Recommendations for Improvement</u></p> <p>None identified.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy, the EIA Regulations, WHO guidance (e.g. Guidelines for Community Noise 1999) and relevant British Standards (e.g. BS 5228-1: 2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites +A1:2014). This would be expected to help ensure that adverse effects on noise associated with new water resources infrastructure are identified, assessed, appropriately mitigated and fully considered by the Secretary of State. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on noise.</p> <p>Overall, this reasonable alternative is considered to have a positive effect on noise, although some uncertainty remains. Uncertain effects arise from the absence of a clear statement on the role of the Secretary of State in seeking to ensure that development avoids, mitigates and minimises adverse noise impacts (as proposed in the draft NPS).</p>
<b>Mitigation</b>	<b>+</b>	<b>+/?</b>	<p><b>Draft NPS:</b> Paragraph 4.11.13 sets out examples of mitigation measures relating to engineering, materials, layout and administration. This has been assessed as having a positive effect on this AoS objective.</p>

## Noise

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><u>Recommendations for Improvement</u></p> <p>To inform the appraisal of this section of the draft NPS, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on noise has been undertaken and this is presented below. This review is intended to help identify where any additional measures could be included in the draft NPS (in the introduction or mitigation section of the topic) to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p> <p><i>Construction</i></p> <p>New or enlarged reservoirs will have lengthy construction times and heavy duty plant and machinery will be required for construction. Together with associated vehicle movements, this will generate noise and vibration which has the potential to impact noise sensitive receptors, depending on the location of development.</p> <p><i>Operation</i></p> <p>Once operational, is not expected that there will be any significant impacts with regard to noise or vibration generation.</p> <p><b>Water Transfer Schemes</b></p> <p><i>Construction</i></p> <p>Water transfer schemes will have lengthy construction times and heavy duty plant and machinery will be required for construction. Together with associated vehicle movements, this will generate noise and vibration which has the potential to impact noise sensitive receptors, depending on the location of development.</p> <p><i>Operation</i></p> <p>There are not expected to be any effects in relation to noise or vibration during the operation of water transfer schemes.</p> <p><b>Desalination</b></p> <p><i>Construction</i></p> <p>Desalination plants will have lengthy construction times and heavy duty plant and machinery will be required for construction. Together with associated vehicle movements, this will generate noise and vibration (including underwater noise) which has the potential to impact noise sensitive receptors, depending on the location of development.</p>

## Noise

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><i>Operation</i></p> <p>Noise and vibration generated from the industrial processes associated with the operation of a desalination plant may have the potential to impact sensitive locations and receptors.</p> <p><b>Potential mitigation measures identified through a review draft WRMPs and their associated SEA Environmental Reports include:</b></p> <ul style="list-style-type: none"> <li>• Noise abatement measures should be implemented to protect people and the environment during construction activities by eliminating noise and substituting less noisy processes or equipment.</li> <li>• Acoustic barriers should be used during construction.</li> <li>• Consideration should be given to construction timing, including vehicles movements, to reduce negative impacts associated with noise and vibration.</li> <li>• Consideration should be given to designing in acoustic features such as strategic siting of infrastructure within the site (e.g. tanks and buildings) to act as acoustic barriers, or designing in features such as sound insulating materials or acoustic insulation barriers.</li> <li>• Best practice methods including the development and implementation of Construction Environmental Management Plans (CEMP) should be used.</li> <li>• HGV movements and construction vehicles should be routed and timed to avoid peak traffic periods (i.e. between 7am-9am and 4pm-6pm) and sensitive receptors.</li> </ul> <p><b>No NPS:</b> Under this alternative, appropriate mitigation measures will be considered by the relevant authority in light of the proposals submitted. As such, mitigation measures will be forthcoming but there is the risk that they will not be comprehensive or consistent (without the direction and guidance given in the draft NPS) and so will not fully address any effects arising or is accompanied by greater uncertainty.</p>
<b>Other Sections of the Draft NPS Relevant to Noise</b>	<p>The following provides additional commentary on the text in the other sections of the draft NPS relevant to noise. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b><u>1. Introduction</u></b></p>		

## Noise

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<p><b>1.1. Background and scope of this NPS</b> – reference to the AoS prepared in support of the draft NPS will help to ensure that the effects on noise are given proper consideration, notwithstanding the fact that there remains uncertainty over potential impacts, particularly in respect of the absence of specific locations and likely effects within the draft NPS.</p> <p>With regard to para 1.1.8, there is an opportunity for the consideration of effects on noise in a specific locality through the preparation of a local impact report submitted by a local authority in accordance with the Planning Act 2008. There is no prescribed format for local impact reports but there is clearly an opportunity for a local authority to comment on relevant issues, helping to ensure that consideration is given to likely effects in a particular locality.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on noise in Scotland and Wales.</p> <p><b>1.3. Infrastructure covered by the Water Resources NPS</b> – as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, it is anticipated that early consideration will be given to the impacts of options on noise.</p> <p><b><u>2. Government policy and the need for water resources infrastructure</u></b></p> <p><b>2.5. The role of water resource management plans in identifying the need</b> – as noted, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on noise. This is reflected paragraph 2.5.7.</p> <p><b>2.6 The need for new water resources infrastructure projects</b> – the section identifies that alongside reservoirs, water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP, when assessed against the relevant threshold in the Planning Act 2008 or through a section 35 referral. These infrastructure types may have noise impacts of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p> <p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p><b><u>3. Assessment Principles</u></b></p> <p><b>3.1 General principles of assessment</b> – the provisions of the Planning Act 2008 and the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, provides the starting point for the assessment of potential noise impacts and the identification of mitigation.</p> <p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, it is anticipated that early consideration will be given to the impacts of options on noise.</p>		

## Noise

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>3.2 Environmental Impact Assessment</b> – the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that effects on noise are fully considered, as will the consideration of cumulative effects and interrelationships between effects.</p> <p>This section specifically highlights that information gathered from the WRMP options assessments and the draft NPS will also be useful to identify the significant effects of a proposed project.</p> <p><b>3.5 Assessment Alternatives</b> – the requirement that reasonable alternatives will need to be considered as part of scheme design and project planning, including as part of the WRMP options appraisal process, should ensure that noise related issues are taken into account, both in terms of protection and opportunities for mitigation and enhancement.</p> <p><b>3.6 Criteria for ‘good design’ for water resources infrastructure</b> – attention to good design principles and implementation will be of benefit to noise aspects through the consideration of how a proposed facility interacts with its context. It is acknowledged that good design, in terms of siting and use of appropriate technologies, can help mitigate adverse impacts, such as noise. As drafted, however, the draft NPS could offer a fuller explanation of how this might be achieved through the integration of noise aspects on site as part of a scheme, as well as broader mitigation measures.</p> <p><b>3.8 Environmental regulation</b> – issues relating to discharges or emissions from a proposed project which affect or include noise and vibration will be subject to separate regulation under the pollution control framework or other consenting or licensing regimes. Any activities within a development that are regulated under those regimes will need to obtain the relevant permissions before the activities can be undertaken. The various planning and pollution control systems will act to protect noise aspects, particularly where these are to be considered as part of the judgement on whether a development is an acceptable use of the land, the impacts of that use, with the assumption that pollution control will be properly applied and enforced. The planning and pollution control systems are separate but complementary. Pollution control is concerned with preventing pollution through the use of measures, such as environmental permits, to prohibit or limit the release of substances to the environment from different sources, to the lowest practicable level.</p> <p><b>3.9 Common Law Nuisance and Statutory Nuisance</b> – there is a direct relationship in terms of adverse effects arising from noise which may be perceived as a nuisance. During examination, possible sources of nuisance under Section 79(1) of the Environmental Protection Act 1990 and how they may be mitigated or limited are considered by the Examining Authority. This will enable the Examining Authority to recommend appropriate requirements that the Secretary of State may wish to include in any subsequent order granting development consent. Possible sources of nuisance under the 1990 Act include, inter alia:</p> <ul style="list-style-type: none"> <li>• noise emitted from premises so as to be prejudicial to health or a nuisance;</li> <li>• noise that is prejudicial to health or a nuisance and is emitted from or caused by a vehicle, machinery or equipment in a street; and</li> <li>• any other matter declared by any enactment to be a statutory nuisance.</li> </ul> <p><b>3.12 Health</b> – notes that where a proposed development has an effect on health, the ES should assess these effects for each element of the project, including in respect of noise, identifying any adverse health impacts and mitigation measures to avoid, reduce or compensate for such impacts as appropriate.</p>

## Noise

Draft NPS Section	Draft NPS	No NPS	Appraisal
Summary Appraisal of Likely Significant Effects	+	+/?	<p><b>Draft NPS:</b> The construction of new water resources infrastructure can be expected to involve the generation of noise which could lead to adverse impacts on sensitive receptors, including adverse effects on sites of importance for nature conservation and local communities. Sources of potential noise include, inter alia, the operation of plant and machinery, construction vehicle movements and operational noise emissions associated with water resources infrastructure such as desalination plants. In this context, the draft NPS seeks to minimise noise pollution and the effects of vibration by requiring the identification and assessment of noise aspects through a noise assessment as part of an ES. The Secretary of State must make a decision based on the noise aspects identified and whether mitigation measures are needed, over and above any which may form part of the development consent application.</p> <p>The draft NPS sets out the nature and extent of the noise assessment and how it should be proportionate to the likely noise impact and that the applicant should consult with various statutory bodies on the requirements for the preparation and contents of an ES; this should help to ensure that effects are properly considered and appropriate mitigation measures are identified.</p> <p>Overall, it is considered that the draft NPS will have a positive effect on this AoS objective as it will help to minimise noise and vibration effects associated with the construction and operation of new water infrastructure, notably on sensitive locations and receptors.</p>
			<p><b>No NPS:</b> Despite the absence of a guiding framework for noise aspects, this reasonable alternative is likely to result in positive effects on noise as any development would be subject to the provisions of national planning policy, the EIA Regulations, WHO guidelines for community noise and relevant British Standards. However, the absence of a clear statement regarding the full range of information to be submitted with regards to noise in an ES may mean that opportunities are lost to effectively identify, assess and mitigate noise aspects. Similarly, the absence of a clear statement on the role of the Secretary of State, including ensuring that development avoids significant adverse noise impacts, risks uncertain effects on the receptors and their surroundings. It is considered that mitigation measures would be forthcoming under this reasonable alternative but there is the risk that they would not fully address the range of impacts associated with nationally significant water resources infrastructure.</p> <p>Overall, this reasonable alternative is considered to have a positive effect on noise, although some uncertainty remains.</p>
Summary of Recommended Mitigation and Enhancement	The draft NPS makes a positive contribution to the AoS objective for noise. However, it is considered that section 4.11 of the draft NPS could be enhanced through, in particular:		

## Noise

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<ul style="list-style-type: none"> <li>making explicit reference to the need to consider the impact on tranquillity;</li> <li>strengthening of linkages to the PPG, WHO standards on noise 'Guidelines for community noise' and the EU Environmental Noise Directive (2002/49/EC);</li> <li>inclusion of reference to the need for applicants to undertake early consultation and engagement with the relevant local authority;</li> <li>the provision of further guidance on the possible contents of an ES;</li> <li>the inclusion of a table in the introductory section identifying potential noise impacts related to the construction and operation of water resources infrastructure and associated mitigation and enhancement measures (as per the other topics that comprise section 4 of the draft NPS).</li> </ul> <p>The following construction-stage mitigation measures are recommended for inclusion:</p> <ul style="list-style-type: none"> <li>Noise abatement measures should be implemented to protect people and the environment during construction activities by eliminating noise and substituting less noisy processes or equipment.</li> <li>Acoustic barriers should be used during construction.</li> <li>Consideration should be given to construction timing, including vehicles movements, to reduce negative impacts associated with noise and vibration.</li> <li>Consideration should be given to designing in acoustic features such as strategic siting of infrastructure within the site (e.g. tanks and buildings) to act as acoustic barriers, or designing in features such as sound insulating materials or acoustic insulation barriers.</li> <li>Best practice methods including the development and implementation of Construction Environmental Management Plans (CEMP) should be used.</li> <li>HGV movements and construction vehicles should be routed and timed to avoid peak traffic periods (i.e. between 7am-9am and 4pm-6pm) and sensitive receptors.</li> </ul>		

## Climatic Factors

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# 10. Climatic Factors

## 10.1 Introduction

This section presents the overview of plans and programmes and baseline information for the appraisal of sustainability of the National Policy Statement for Water Resources Infrastructure and reasonable alternatives in respect of climatic factors.

Climate change within this context is concerned with increasing the likelihood of climate change effects through greenhouse gas emissions, and the ability to adapt to the effects of climate change such as the occurrence of more extreme weather events.

There are links between climate change and the majority of other topics in the Appraisal of Sustainability (AoS), including biodiversity and nature conservation, land use, geology and soil, water quality and quantity, human health, flood risk, traffic and transport and air quality.

## 10.2 Review of Plans and Programmes

The range of plans and policies reviewed seek to promote both climate change mitigation and adaptation. Climate change is expected to have a significant effect on the water environment, both affecting water availability and there are a number of key international agreements in place that seek to mitigate climate change, including most recently the **Paris Agreement (2015)**. The **Climate Change Act (2008)** puts targets for reducing greenhouse gas emissions on a statutory footing.

Climate change adaptation is actively promoted through the NPPF and associated Planning Practice Guidance. **Adapting Energy, Transport and Water Infrastructure to the Long-term Impacts of Climate Change (2010)** takes a long-term view of adapting water resources infrastructure to climate change.

### International/European

The **United Nations Framework Convention on Climate Change** (UNFCCC) sets an overall framework for international action to tackle the challenges posed by climate change. The Convention sets an ultimate objective of stabilising greenhouse gas concentrations "*at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system.*" The Convention requires the development and regular update of greenhouse gas emissions inventories from industrialised countries, with developing countries also being encouraged to carry out inventories. The countries who have ratified the Treaty, known as the Parties to the Convention, agree to take climate change into account in such matters as agriculture, industry, energy, natural resources and where activities involve coastal regions. The Parties also agree to develop national programmes to slow climate change.

The two main agreements resulting from the UNFCCC to date are the **Kyoto Protocol (1997)** and the **Paris Agreement (2015)**. The Kyoto Protocol sought to establish an international mechanism to reduce emissions of greenhouse gas emissions and in consequence set binding emissions reduction targets for 37 industrialised countries and the European Community. These targets equated to an average of 5% reductions relative to 1990 levels over the five-year period 2008-12. The key distinction between this and the UNFCCC is that the Convention encourages nations to stabilise greenhouse gases while the Kyoto Protocol committed them to doing so through greenhouse gas reductions. It included three market-based



## Climatic Factors

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mechanisms to meet these targets: emissions trading; the clean development mechanism (CDM); and Joint Implementation (JI).

The Protocol's first commitment period started in 2008 and ended in 2012. At the Durban conference in December 2011, governments decided that the Kyoto Protocol would move into a second commitment period in 2013, in a seamless transition from the end of the second commitment period in 2012.

Governments of Parties to the Kyoto Protocol also made amendments to the Protocol, among others, the range of greenhouse gases covered.

The Paris Agreement (2015) was agreed in December 2015 and, upon ratification by signatories responsible for more than 55% of global greenhouse gas emissions, came into force on 5<sup>th</sup> October 2016. The Agreement's main aim is to keep a global temperature rise this century "*well below*" 2 degrees Celsius and to drive efforts to limit the temperature increase even further to 1.5 degrees Celsius above pre-industrial levels. The main climate change mitigation delivery mechanism is the submission of five year Nationally Determined Contributions (NDCs) by all signatories with a steadily increasing ambition in the long term.

At the European level, the European Union's (EU) submission to the Paris Agreement establishes an overall binding commitment to reduce domestic greenhouse gas emissions by at least 40% by 2030 compared to 1990, in line with targets set out in the EU 2030 Climate and Energy Policy Framework (October 2014). Given the result of the EU referendum held on 23<sup>rd</sup> June 2016, in due course it may be necessary for the UK Government to submit separate NDCs to the UNFCCC. However, at the present time the UK remains a member of the EU and is therefore obligated to contribute towards achieving the emissions reduction targets specified in the EU's submission to the Paris Agreement.

In March 2007, the European Union's (EU) leaders endorsed an integrated approach to climate and energy policy that aims to combat climate change and increase the EU's energy security while strengthening its competitiveness. They committed Europe to transforming itself into a highly energy-efficient, low carbon economy. It set a series of demanding climate and energy targets to be met by 2020, known as the "20-20-20" targets. These are:

- a reduction in EU greenhouse gas emissions of at least 20% below 1990 levels;
- 20% of EU energy consumption to come from renewable resources; and
- a 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency.

To secure a reduction in EU greenhouse gases, the **EU Emissions Trading Scheme (EU ETS)**, a Europe wide scheme was introduced in 2005. EU ETS puts a price on carbon that businesses use and creates a market for carbon. It allows countries that have emission units to spare (emissions permitted to them but not "used") to sell this excess capacity to countries which are likely to exceed their own targets. **The Integrated Climate and Energy Package** included a revision and strengthening of the ETS. A single EU-wide cap on emission allowances applied from 2013 and will be cut annually, reducing the number of allowances available to businesses to 21% below the 2005 level in 2020. The free allocation of allowances will be progressively replaced by auctioning, and the sectors and gases covered by the system will be somewhat expanded.

The **Seventh EU Environmental Action Plan (EAP) (2013-2020)** reviews the significant environmental challenges and provides a framework for European environmental policy up to 2020. The programme identifies three priority areas where more action is needed to protect nature and strengthen ecological resilience, boost resource-efficient, low-carbon growth, and reduce threats to human health and well-being linked to pollution, chemical substances, and the impacts of climate change.

## Climatic Factors

The **Renewable Energy Directive (2009/28/EC)** mandates levels of renewable energy use within the EU. The Directive requires EU Member States to produce a pre-agreed proportion of energy consumption from renewable sources such that the EU as a whole shall obtain at least 20% of total energy consumption from renewables by 2020. This is then apportioned across Member States. The UK's target is for 15% of energy consumption in 2020 to be from renewable sources. Under Article 4 of the Directive, each Member State is also required to adopt a National Renewable Energy Action Plan that will set out the trajectory and measures that will enable the target to be met.

The **Energy Efficiency Directive (2012/27/EU)** sets the framework for measures to promote energy efficiency across the EU and help the EU reduce its energy consumption by 20%.

EU leaders agreed on 23 October 2014 the domestic 2030 greenhouse gas reduction target of at least 40% compared to 1990 together with the other main building blocks of the **2030 Policy Framework for Climate and Energy**, as proposed by the European Commission in January 2014. This 2030 policy framework aims to make the EU's economy and energy system more competitive, secure and sustainable and also sets a target of at least 27% for renewable energy and energy savings by 2030.

The Commission adopted the **EU Strategy on Adaptation to Climate Change** in April 2013. The Strategy has three key objectives:

- Promoting action by Member States: The Commission will encourage all Member States to adopt comprehensive adaptation strategies and will provide funding to help them build up their adaptation capacities and take action.
- 'Climate-proofing' action at EU level by further promoting adaptation in key vulnerable sectors such as agriculture, fisheries and cohesion policy, ensuring that Europe's infrastructure is made more resilient, and promoting the use of insurance against natural and man-made disasters.
- Better informed decision-making by addressing gaps in knowledge about adaptation and further developing the European climate adaptation platform (Climate-ADAPT) as the 'one-stop shop' for adaptation information in Europe.

## UK

In the UK, the **Climate Change Act 2008** introduced legislative targets for reducing the UK's impacts on climate change and the need to prepare for its impacts. The Act sets binding targets for a reduction in CO<sub>2</sub> emissions of 80% by 2050, compared to a 1990 baseline. Interim targets and five-year carbon budget periods are used to ensure progress towards the 2050 target. The Climate Change Act 2008 also requires the Government, on a regular basis, to assess the risks to the UK from the impact of climate change and report to Parliament. The UK Committee on Climate Change Adaptation Sub-committee is responsible for preparing these climate change risk assessments, the latest of which, the second UK Climate Change Risk Assessment (CCRA2) Evidence Report, was published in July 2016<sup>287</sup>. As required under sections 12 and 14 of the Climate Change Act 2008, **The Carbon Plan: Delivering our Low Carbon Future (2011)** sets out proposed measures to implement the UK's first four carbon budgets and thereby achieve a 50% reduction in the UK's annual net carbon account by 2027 (from 1990 levels). The plan builds upon the previous Low Carbon Transition Plan (2009) and includes proposals for energy efficiency, heating, transport and industry.

<sup>287</sup> UK CCC ASC (2016) *UK Climate Change Risk Assessment 2017: CCRA2 Evidence Report*. Available online at: <https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/>

## Climatic Factors

On 30<sup>th</sup> June 2016, the UK Government confirmed its intention to set the Fifth Carbon Budget to reduce UK greenhouse gas emissions by 57% by 2030 relative to 1990 levels<sup>288</sup>. This is in line with advice provided to the UK Government by the UK Committee on Climate Change, and in due course a report on policies and proposals to achieve this Fifth Carbon Budget will need to be laid before the UK Parliament.

In relation to the decarbonisation of the energy generation sector, the UK Government's **Renewables Strategy (2009)** sets out the path for the UK to meet the legally-binding target (under the Renewable Energy Directive (2009/28/EC)) to ensure 15% of energy comes from renewable sources by 2020. The **UK Renewable Energy Roadmap Update 2013** provides the latest available analysis regarding achievements and changes that have taken place in pursuit of achieving this target. The update includes energy demand and technology cost projections, as well as a 'bottom up' review of projects that could well come forward.

The **Energy Act 2013** establishes a legislative framework for delivering secure, affordable and low carbon energy and includes provisions on: decarbonisation; electricity market reform; nuclear regulation; government pipe-line and storage system; and consumer protection amongst others.

On the 23rd June 2011, the Department for Energy and Climate Change (now BEIS) designated the **National Policy Statements** (NPS) for energy infrastructure. These statements set out the Government's policy for delivery of major energy infrastructure. NPS **EN-1** sets out the Government's overall policy for delivery of major energy infrastructure. A further five technology-specific NPSs for the energy sector cover: fossil fuel electricity generation (**EN-2**); renewable electricity generation (both onshore and offshore) (**EN-3**); gas supply infrastructure and gas and oil pipelines (**EN-4**); the electricity transmissions and distribution network (**EN-5**); and nuclear electricity generation (**EN-6**).

## England

The **National Planning Policy Framework (MHCLG, 2018)** provides a set of core land-use planning principles that should underpin both plan-making and decision-taking. These include supporting "the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure" (paragraph 148). In turn, Plans are expected to take a proactive approach to mitigating and adapting to climate change in light of its long term implications including changes to flood risk and water supply. New development should both avoid increased vulnerability to the range of impacts arising from climate change and help to reduce greenhouse gas emissions, such as through its location, orientation and design. When determining applications, applicants should not be required to demonstrate the overall need for renewable or low carbon energy and the application should be approved if the impacts can be made acceptable (paragraph (154)

The section of **Planning Practice Guidance** (2014) regarding Climate Change advises how planning can identify suitable mitigation and adaptation measures in plan-making and the application process to address the potential impacts of climate change. This includes potential climate change adaptation options such as the availability of water and water infrastructure for the lifetime of the development and design responses to promote water efficiency and protect water quality.

<sup>288</sup> UK Committee on Climate Change (2016) CCC welcomes Government backing for fifth carbon budget and continued ambition to meet 2050 target. Available online at: <https://www.theccc.org.uk/2016/06/30/ccc-welcomes-government-backing-for-fifth-carbon-budget-and-continued-ambition-to-meet-2050-target/>

## Climatic Factors

In 2010 Defra published **Adapting Energy, Transport and Water Infrastructure to the Long-term Impacts of Climate Change**. The report sets out the case for adapting infrastructure in the energy, transport and water sectors so that new and existing infrastructure is able to operate effectively in a long-term changing climate. The report focuses on the long-term impacts of climate change (2030s to 2100) to the infrastructure in the 3 sectors, setting out:

- the long-term risks from climate to the infrastructure, both technically and operationally;
- the need to consider the interdependency risks of the infrastructure system and how this can be exacerbated by long-term climate change;
- the need for all infrastructure to consider the long-term impacts of climate change in its design, build and operation;
- the adaptation options available, as well as barriers possibly preventing action; and
- suggested recommendations to the Infrastructure and Adaptation project as part of its 2-year programme of work.

**A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)** includes policies and actions designed to promote climate change mitigation and adaptation including: continuing to cut greenhouse gas emissions; making sure that all policies, programmes and investment decisions take into account the possible extent of climate change this century; and implementing a sustainable and effective second National Adaptation Programme.

## Scotland

The **Climate Change (Scotland) Act 2009** sets binding net carbon emission reduction targets of 42% by 2020 and 80% by 2050 compared with 1990 levels, and also requires Scottish Ministers to meet annual emission reductions targets in line with a trajectory towards the 2050 target. Taken together, the Climate Change (Annual Targets) (Scotland) Orders of 2010, 2011 and 2016 specify annual emission reduction targets until 2032. All of these targets relate to a basket of six greenhouse gases recognised by the UNFCCC and includes Scotland's share of emissions from international aviation and international shipping. In addition, section 44 of the Act requires all public bodies, including planning authorities and the Scottish Government itself, to "act in the way best calculated to contribute to the delivery of the emissions targets". **A Low Carbon Economic Strategy for Scotland: Scotland – A Low Carbon Society (2011)** is an integral part of the Scottish Government's Economic Strategy to secure economic growth, and a key component of the broader approach to meet Scotland's climate change targets and secure the transition to a low carbon economy in Scotland.

The **Electricity Generation Policy Statement – 2013 (EGPS)** examines the way in which Scotland generates electricity and considers the changes which will be necessary to meet the targets which the Scottish Government has established and reflects both views from industry and other stakeholders and also developments in UK and EU electricity policy. It looks at the sources from which that electricity is produced, the amount of electricity which we use to meet our own needs and the technological and infrastructural advances and requirements which Scotland will require over the coming decade and beyond.

On the 27th June 2013, the Scottish Government published the report **Low Carbon Scotland: Meeting our Emissions Reduction Targets 2013-2027: The Second Report on Proposals and Policies (RPP2)**. This fulfils the duty place on Scottish Ministers by Section 35 of the Climate Change (Scotland) Act 2009, to lay before the Scottish Parliament a Report on Proposals and Policies setting out specific measures for reducing greenhouse gas emissions to meet Scotland's ambitions statutory targets. The RPP2 is structured around the

## Climatic Factors

key sectors of energy supply, homes and communities, business and the public sector, transport, waste and rural land use. For each of these sectors, policies to reduce greenhouse gas emissions are identified, as are a number of proposals for further consideration and development. Taken together, these policies and proposals show that it is possible to meet the climate change targets established by the Climate Change (Scotland) Act 2009. The ***Draft Climate Change Plan - The Draft Third Report on Policies and Proposals 2017-2032*** was published in January 2017, updating the proposed decarbonisation pathway to 2032.

The ***Scottish Energy Strategy***, published in December 2017 and the first of its kind, sets out the Scottish Government's vision for the future energy system in Scotland. The Strategy describes the ways in which the Scottish Government will strengthen the development of local energy, protect and empower consumers, and support Scotland's climate change ambitions while tackling poor energy provision.

The ***2020 Route map for Renewable Energy in Scotland (2015)*** is an update and extension to the ***Scottish Renewables Action Plan 2009***. This updated and expanded Route map reflects the challenge of the target to generate the equivalent of 100% of gross annual consumption by 2020, as well as the target of 11% renewable heat.

The ***Scottish Planning Policy (SPP) (2014)*** sets out that the planning system should:

- support the transformational change to a low carbon economy, consistent with national objectives and targets, including deriving:
  - ▶ 30% of overall energy demand from renewable sources by 2020;
  - ▶ 11% of heat demand from renewable sources by 2020; and
  - ▶ the equivalent of 100% of electricity demand from renewable sources by 2020;
- support the development of a diverse range of electricity generation from renewable energy technologies – including the expansion of renewable energy generation capacity – and the development of heat networks;
- guide development to appropriate locations and advise on the issues that will be taken into account when specific proposals are being assessed;
- help to reduce emissions and energy use in new buildings and from new infrastructure by enabling development at appropriate locations that contributes to:
  - ▶ energy efficiency;
  - ▶ heat recovery;
  - ▶ efficient energy supply and storage;
  - ▶ electricity and heat from renewable sources; and
  - ▶ electricity and heat from non-renewable sources where greenhouse gas emissions can be significantly reduced.

***Scotland's Third National Planning Framework (NPF) (2014)*** is a long-term strategy for Scotland. It is the spatial expression of the Government Economic Strategy, and the plans for development and investment in infrastructure. NPF identifies national developments and other strategically important development opportunities in Scotland. It is accompanied by an Action Programme which identifies how they expect it to be implemented, by who, and when. Their ambition is to achieve at least an 80% reduction in greenhouse gas emissions by 2050 and foresee that planning will play a key role in delivering on the commitments set out in

## Climatic Factors

Low Carbon Scotland: the Scottish Government's report on proposals and policies (RPP2). The priorities identified in the NPF set a clear direction of travel which is consistent with their climate change legislation.

### Wales

**Energy Wales: A Low Carbon Transition (2012)** sets out the Welsh Government's aim to enhance the economic, social and environmental wellbeing of the people and communities of Wales – to achieve a better quality of life for our own and future generations. As set out in the Programme for Government, their ambition is therefore to: 'create a sustainable, low carbon economy for Wales'. In doing so, they want to ensure full advantage is taken of the transition to a low carbon economy to secure a wealthier, more resilient and sustainable future for Wales.

The Welsh Assembly Government have a clear role to play in tackling climate change. **Climate Change Strategy for Wales (2010)** and its associated delivery plans set targets to reduce greenhouse gas emissions in Wales by 3% every year and achieve at least a 40% reduction by 2020 compared to figures from 1990, as well as establishing measures to address climate change adaptation.

The **Well-being and Future Generations Act (Wales) 2015** requires Welsh Ministers and public bodies to "take account of the report containing an assessment of the risks for the United Kingdom of the current and predicted impact of climate change most recently sent to the Welsh Ministers under section 56(6) of the **Climate Change Act 2008** (c.27)" (the UK Climate Change Risk Assessment). This applies to Welsh Ministers under Section 11 of the Act, when preparing their Future Trends Report, and to Public Services Boards under Section 38, when preparing their Local Assessments of Well-being.

Part 2 of the **Environment (Wales) Act 2016** establishes a statutory framework for action on climate change, including targets for reducing emissions of greenhouse gasses and associated duties. The Welsh Ministers are required to ensure that the 'net Welsh emissions account' for the year 2050 is at least 80% lower than the baseline, set at 1990 emissions levels, and they must also specify in regulations interim targets for 2020, 2030 and 2040 and set five yearly carbon budgets. The targets must be set after the Welsh Ministers have received advice from the UK CCC, and the Welsh Ministers must produce a report detailing the policies and proposals that will deliver emissions reductions necessary to meet the interim and overall targets, as well as regular progress reports. The Act also contains a range of other provisions regarding the sustainable management of natural resources, specifically including measures to enhance resilience.

**Planning Policy Wales (Edition 9, 2016) (PPW)** sets out several objectives in respect of climate change mitigation and adaptation. It promotes:

- Planning to minimise the causes of climate change by taking decisive action to move towards a low carbon economy by proactively reducing the demand for energy, facilitating the delivery of new and more sustainable forms of energy provision at all scales and minimising the emissions of greenhouse gases to the atmosphere.
- Planning for the consequences of climate change.

PPW is supported by the following Technical Advice Notes (TANs) that are particularly relevant to climate change:

- TAN 8: Renewable Energy (2005);
- TAN12: Design (2016); and,
- TAN 15: Development and Flood Risk (2004).



## Climatic Factors

### 10.3 Overview of the Baseline

#### International

##### Climate

The UNFCCC, Paris Agreement and other international measures to combat climate change are influenced by regular reports from the Intergovernmental Panel on Climate Change (IPCC). The IPCC's **Fifth Assessment Report**<sup>289</sup> (referred to as AR5) provides the most up to date view of scientific knowledge regarding climate change and in summary concludes that:

- unprecedented atmospheric concentrations of carbon dioxide, methane and nitrous oxide, resulting from industrial activities including fossil fuel combustion, are "extremely likely to have been the dominant cause of the observed warming since the mid-20th century". Total anthropogenic greenhouse gas (GHG) emissions were the highest in human history from 2000 to 2010 and the energy supply sector generated 25% of total GHG emissions in 2010; and
- climate change risks and impacts "can be reduced by limiting the rate and magnitude of climate change". AR5 calls for low carbon energy technologies to generate more than 80% of electricity by 2050 and for unabated fossil fuel generation to be virtually phased out by 2100.

The report also identifies certain impacts that climate change has already had on freshwater ecosystems, for example:

- Many terrestrial, freshwater and marine species have shifted their geographic ranges, seasonal activities, migration patterns, abundances and species interactions in response to ongoing climate change.

#### UK

##### Climate

The UK is presently influenced by predominantly westerly tracking storm systems throughout the year. Variations in temperature, precipitation and wind speeds may be partly accounted for by exposure, latitude and altitude. The surrounding seas also have a significant effect on the national and local weather conditions. The temperatures of air masses reaching the UK have been modified by the ocean such that the UK tends to experience lower summer temperatures than mainland Europe, but milder winters. In the recent past, the Central England temperature has risen ~1°C since 1970, and Scottish temperatures have risen 0.8°C since 1980.

All areas of the UK are getting warmer, and the warming is greater in summer than in winter<sup>290</sup>. There is little change in the amount of precipitation (rain, hail, snow, etc.) that falls annually, but more is falling in the winter, with drier summers, for much of the UK. Sea levels are rising, and are greater in the south of the UK than the north. Widespread flooding events cannot be directly attributed to climate change but it is expected to see more extreme rainfall events in the future, and hence more flooding as the climate changes.

<sup>289</sup> Intergovernmental Panel on Climate Change (2015) *Synthesis Report - Summary for Policymakers*. Available online at: [http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5\\_SYR\\_FINAL\\_SPM.pdf](http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf)

<sup>290</sup> Defra (2009) *Adapting to climate change – UK Climate Projections*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/69257/pb13274-uk-climate-projections-090617.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69257/pb13274-uk-climate-projections-090617.pdf)

## Climatic Factors

The UK is experiencing sea level rise of approximately 1mm per year. Global sea-level is rising at about 3mm per year<sup>291</sup>. Sea-surface temperatures around the UK coast have risen over the past three decades by about 0.7°C. Global average temperatures are rising at about 0.2°C per decade. Severe windstorms around the UK have become more frequent in the past few decades, though not above that seen in the 1920s. Annual mean precipitation over England and Wales has not changed significantly since records began; however seasonal rainfall appears to be decreasing in summer and increasing in winter.

More specifically, the following observations can be made:

- Central England temperature has risen by about one degree Celsius since the 1970s, with 2006 being the warmest on record. All regions of the UK have experienced an increase in average temperatures between 1961 and 2006 annually, and for all seasons. Increases in annual average temperature are typically between 1.0 and 1.7°C, tending to be largest in the south and east of England and smallest in Scotland.
- All regions of the UK have experienced an increase over the past 45 years in the contribution to winter rainfall from heavy precipitation events; in summer, all regions except north east England and north Scotland show decreases.
- Severe windstorms around the UK have become more frequent in the past few decades, though not above that seen in the 1920s.
- There has been considerable variability in the North Atlantic Oscillation, but with no significant trend over the past few decades.
- Sea-surface temperatures around the UK coast have risen over the past three decades by about 0.7°C.
- Sea level around the UK rose by about 1 mm/yr in the 20th Century, corrected for land movement. The rates for the 1990s and 2000s have been higher than this.
- The annual number of days with air frost has reduced in all regions of the UK between 1961 and 2006. There are now typically between 20 and 30 fewer days of air frost per year, compared to the 1960s, with the largest reductions in northern England and Scotland.
- There has been a decrease in the average number of Heating Degree Days (HDD), and an increase in the average number of Cooling Degree Days (CDD) in all administrative regions of the UK as a whole, between 1961 and 2006.
- There has been a slight increase in average annual precipitation in all regions of the UK between 1961 and 2006, however this trend is only statistically significant above background natural variation in Scotland where an increase of around 20% has been observed. Likewise, an increase in average winter precipitation is only statistically significant in northern England and Scotland where increases of 30-65% have been experienced.
- Average annual and seasonal relative humidity has decreased in all regions of the UK, except Northern Ireland, between 1961 and 2006, by up to 5%.

<sup>291</sup> UK Climate Impact Projects (2009) *The climate of the UK and recent trends*. Available online at: <http://ukclimateprojections.metoffice.gov.uk/media.jsp?mediaid=87933&filetype=pdf>



## Climatic Factors

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The **second UK Climate Change Risk Assessment (CCRA2) Evidence Report (2016)**<sup>292</sup> reviews a range of evidence sources, including the UK Climate Impact Projections 2009 (UKCIP09), and concludes that climate change is already affecting both the natural and built environments across the UK.

### Energy

The **Digest of UK Energy Statistics 2016**<sup>293</sup> provides the latest official statistics regarding energy generation/production capacity and consumption across the UK in 2015. Key statistics of relevance include:

- In 2015 primary energy production rose by 9.6 per cent compared with a year earlier, its first increase since 1999, as output of oil and gas from the UK Continental Shelf were both up. Low carbon sources including nuclear, wind, solar photovoltaics and bioenergy all grew strongly. Coal output though was down to a record low level owing to recent mine closures.
- Final energy consumption rose by 0.4 per cent, reflecting the cooler weather in 2015 compared to 2014. On a temperature adjusted basis, final energy consumption was down 0.8 per cent continuing the downward trend of the last ten years.
- Electricity generated from renewable sources in the UK in 2015 increased by 29 per cent on a year earlier, and accounted for 25 per cent of total UK electricity generation, up from 19.1 per cent in 2014. Total renewables, as measured by the 2009 EU Renewable Energy Directive, accounted for 8.3 per cent of energy consumption in 2015, up from 7.1 per cent in 2014.
- The UK remained a net importer of energy, though with a decreased dependency level (imports / energy use) of 38 per cent; this continues the trend from 2004 when the UK once again became a net importer of fuel. In 2015 the UK was a net importer of all main fuels types.
- In 2015, gas was the main fuel used for electricity generation, with its share remaining at 30 per cent. Coal's share decreased from 30 per cent to 22 per cent, whilst nuclear's share increased to 21 per cent following outages in the second half of 2014.

### Greenhouse Gas (GHG) Emissions

The Climate Change Act 2008 prescribes that the UK's GHG inventory covers the six direct greenhouse gases under the Kyoto Protocol, namely:

- Carbon dioxide (CO<sub>2</sub>);
- Methane (CH<sub>4</sub>);
- Nitrous oxide (N<sub>2</sub>O);
- Hydrofluorocarbons (HFCs);
- Perfluorocarbons (PFCs); and
- Sulphur hexafluoride (SF<sub>6</sub>).

These gases contribute directly to climate change owing to their positive radiative forcing effect. HFCs, PFCs and SF<sub>6</sub> are collectively known as the 'F-gases'. In general terms, the largest contributor to global warming is

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<sup>292</sup> UK CCC ASC (2016) *UK Climate Change Risk Assessment 2017: CCRA2 Evidence Report*. Available online at: <https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/>

<sup>293</sup> DECC (2016) *Digest of UK Energy Statistics 2016*. Available online at: <https://www.gov.uk/government/collections/digest-of-uk-energy-statistics-dukes>

## Climatic Factors

CO<sub>2</sub> which makes it the focus of many climate change initiatives. Methane and nitrous oxide contribute to a smaller proportion, typically <10%, and the contribution of F-gases is even smaller (in spite of their high Global Warming Potentials) at <5% of the total. The Climate Change Act 2008 requires an 80% reduction in the UK's 'net carbon account' by 2050, covering all six of the individual greenhouse gases listed above.

The latest official statistics regarding greenhouse gas emissions covered under the Climate Change Act 2008 were provided by the Department for Business, Energy & Industrial Strategy for 2015 in the **Annual Statement of Emissions (2017)**. This statistical publication notes that:

- In 2015, UK net carbon account emissions were estimated to be 467.5 million tonnes carbon dioxide equivalent (MtCO<sub>2</sub>e). This was 9.1 percent lower than the 2014 figure of 514.4 million tonnes and 16.8 percent lower than the 2013 figure of 557.3 million tonnes.
- Between 2013 and 2014, the largest decreases came from the energy supply sector, down 13.6 percent (25.7 MtCO<sub>2</sub>e) due to a decrease in the use of coal for electricity generation; and the residential sector, down by 17.0 percent (13.1 MtCO<sub>2</sub>e) due to a reduction in use of natural gas for space heating. Demand for heating was lower in 2014 due to the temperature being 1.2 degrees Celsius warmer on average than 2013.
- Carbon dioxide (CO<sub>2</sub>) is the main greenhouse gas, accounting for 82 percent of total UK greenhouse gas emissions in 2014. In 2014, UK net emissions of carbon dioxide were estimated to be 422.0 million tonnes (Mt). This was around 8.9 percent lower than the 2013 figure of 463.3 Mt. Around half of this decrease was due to 2014 being a warmer year than 2013.
- For the purposes of carbon budgets reporting, UK greenhouse gas emissions in 2014 were 455.6 MtCO<sub>2</sub>e which is 100.8 MtCO<sub>2</sub>e below the average annual emissions required to meet the second carbon budget (2013-2017).

## England

**Greenhouse Gas inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2014 (2017)**<sup>294</sup> presents the latest estimates of greenhouse gas (GHG) emissions for the UK Devolved Administrations (DAs): England, Scotland, Wales and Northern Ireland.

With specific regard to England, it had a 76% share of total net UK GHG emissions in 2015. England has seen a decrease of 41% in greenhouse gas emissions between 1990 and 2015 with a reduction of approximately 5% between 2014 and 2015. This has predominantly been driven by a reduction in emissions from the use of coal in the power generation sector and natural gas in the residential sector, with a reduction in emissions from anaerobic managed waste disposal sites also making a substantial contribution. Greenhouse gas (GHG) emissions for England in 2015 totalled 368,812 ktCO<sub>2</sub>e, with the dominant emission sources being electricity production (21% of total GHG emissions), cars (15%), residential combustion for heating and cooking (14%). Key sectoral trends in England up to 2015 were:

- Emissions from the energy supply sector decreased by 54% between 1990 and 2015, with a 19% decrease in overall emissions between 2014 and 2015. This decrease was mainly due to a reduction in the use of coal in the power generation sector.

<sup>294</sup> Ricardo Energy & Environment for the Department of Energy and Climate Change, The Scottish Government, The Welsh Government and The Northern Ireland Department for Agriculture, Environment and Rural Affairs (2017) *Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2015. 2017*. Available online at: [http://naei.defra.gov.uk/reports/reports?report\\_id=932](http://naei.defra.gov.uk/reports/reports?report_id=932)

## Climatic Factors

- Emissions from the industrial process sector decreased significantly since 1990 by 84% mainly as a result of a declining chemical and fluorocarbon production industry.
- Emissions from the waste management sector significantly declined by 73% since 1990, largely due to the progressive introduction of methane capture and oxidation systems within landfill management. Emissions decreased by 8% between 2014 and 2015, primarily due to UK-wide reductions in methane emission estimates from landfill due to improved management systems.
- Emissions from the business sector reduced by 24% since 1990 as a result of reduced emissions in manufacturing industries (led by chemicals, non-ferrous metals and other manufacturing) through industrial decline and efficiency improvements. Emissions have recently remained relatively stable, decreasing by 2% between 2014 and 2015.
- Emissions from the residential sector decreased by 15% since 1990 as a result of a switch from less efficient solid and liquid fuels to natural gas for heating, and improvements in energy efficiency. Emissions between 2014 and 2015 increased by 4% primarily as a result of an increased energy demand for natural gas for residential heating.
- Emissions from the agricultural sector reduced by 20% since 1990 mainly due to reductions in fertiliser use and resulting nitrous oxide emissions from soils, and reduced animal numbers resulting in reduced methane from dairy cattle. There was a negligible change in agricultural emissions from 2014 to 2015.
- The Land Use, Land Use Change and Forestry (LULUCF) sector was a source of emissions between the Base Year and 2003 after which the LULUCF sector was a sink. This was as a result of significant decreases in the conversion of land to cropland and settlements, and an increase in grassland carbon storage. This change to a sink was slowed by increased carbon emissions from cropland activities and the harvesting of some of the forest carbon stocks. The net sink increased by 3% between 2014 and 2015 as a result of changes in harvested wood products.
- Emissions from the transport sector decreased by 3% between 1990 and 2015 due to improvements in efficiency of transport vehicles despite growth in transport demand over the period. Emissions between 2014 and 2015 increased by 2% mainly due to increasing emissions from light/heavy lorries and busses.
- Emissions from the public sector reduced by 38% since the Base Year. This is due to increased energy efficiency measures and the switch to gas-fired heating. There was a negligible change in public sector emissions from 2014 to 2015.

Ofwat identified that in 2014-15, of the 19 water companies in England and Wales (noting that Severn Trent Water supplies both England and Wales) the performance of 16 of them with regards to greenhouse gas emissions was in line with or better than expected. For one, performance was not in line with expectations but had only slipped slightly. For two companies, performance was significantly below expectation<sup>295</sup>.

<sup>295</sup> Ofwat (2015) *Environmental Impact 2014-15*. Available online at:

<http://www.ofwat.gov.uk/regulated-companies/company-obligations/performance/companies-performance-2014-15/environmental-impact/>

## Climatic Factors

### Scotland

#### Greenhouse Gas Emissions

**Scottish Greenhouse Gas Emissions 2015**<sup>296</sup> provides the latest estimates of greenhouse gas emissions in Scotland for the years 1990 to 2015 and also provides information on the nation's performance against emissions reduction targets set under the Climate Change (Scotland) Act 2009. This publication notes that in 2015, Scottish source emissions of the basket of greenhouse gases are estimated to be 48.1 million tonnes carbon dioxide equivalent (MtCO<sub>2</sub>e). This is 3.0 per cent lower than the 2014 figure of 49.5 MtCO<sub>2</sub>e, a 1.5 MtCO<sub>2</sub>e decrease. The main contributor to this reduction between 2014 and 2015 is:

- fall in energy supply emissions (such as power stations) (1.7 MtCO<sub>2</sub>e; 12.0 per cent reduction)

Between 1990 and 2015, there was a 37.6 per cent reduction in estimated emissions, a 28.9 MtCO<sub>2</sub>e decrease. The 3 main contributors to this reduction are:

- fall in energy supply emissions (such as power stations) (10.5 MtCO<sub>2</sub>e; 46.4 per cent reduction);
- fall in business and industrial process emissions (such as manufacturing) (5.8 MtCO<sub>2</sub>e; 40.2 per cent reduction);
- fall in waste management emissions (such as landfill) (4.2 MtCO<sub>2</sub>e; 74.9 per cent reduction).

However, the adjusted emissions to account for Scotland's participation in EU-wide emissions trading and are used to measure progress against targets show a 1.8% increase in emissions. Despite the increase, The Climate Change (Scotland) Act 2009 provides for a fixed annual target for 2015 of 45.928 MtCO<sub>2</sub>e, which was met.

Scottish Water identifies that after rising in 2014/15 due to an increase in the carbon intensity of grid electricity, its annual carbon footprint fell by 14,000 tonnes of carbon dioxide equivalent (tCO<sub>2</sub>e) to 390,000 tCO<sub>2</sub>e in 2015/16, a reduction of 3.5%. A reduction in grid carbon intensity was one of the main reasons behind this fall. Since Scottish Water began monitoring and reporting its carbon footprint in 2006/07, annual emissions have fallen by almost 16%<sup>297</sup>.

#### Energy

**Energy in Scotland 2017**<sup>298</sup> states that renewable has more than trebled since the end of 2006 and is now equivalent to over half of the electricity consumed in Scotland. Already met the 2020 target to install 500 MW of community and locally owned renewable generation capacity. Renewable heat output is nearly 5 times the level it was in 2008/09.

<sup>296</sup> Scottish Government (2017). *Scottish Greenhouse Gas Emissions 2015*. Available online at: <http://www.gov.scot/Resource/0052/00520839.pdf>

<sup>297</sup> Scottish Water (2016) *Sustainability Report 2016*. Available online at: <http://www.scottishwater.co.uk/-/media/about-us/images/corporate-responsibility/a63157sustainabilityreportthr.pdf?la=en>

<sup>298</sup> Scottish Government (2017). *Energy in Scotland 2017*. Available online at: <http://www.gov.scot/Resource/0051/00514474.pdf>

## Climatic Factors

### Wales

#### **Greenhouse Gas inventories for England, Scotland, Wales and Northern Ireland: 1990-2014 (2017)**<sup>299</sup>

provides the latest estimates of greenhouse gas emissions in Wales, up to the year 2015. This publication notes that total emissions from Wales reduced between 1990 and 2015 by 20%. These emission reductions are mainly due to efficiencies in energy generation and business sector heating, the use of natural gas to replace some coal and other fuels as well as abatement in some chemical industries, and variations in manufacturing output (e.g. in iron and steel, bulk chemical production). Total greenhouse emissions decreased between 2014 and 2015 by 1%. This net figure is a balance between large reductions in emissions in some sectors, such as iron and steel, balanced aged increases in other sectors such as home energy use. Further details from the inventory include:

- Emissions from the energy supply sector decreased by 3% between 1990 and 2014 due to decreases in emissions from power stations. There was a negligible change in energy supply sector emissions from 2014 to 2015.
- Emissions from the transport sector only decreased by 1% between 1990 and 2014 despite improvements in efficiency of transport vehicles, as a result of growth in transport demand since 1990 and increased affordability of cars over the period. Emissions between 2014 and 2015 increased by 2% mainly due to increasing emissions from light/heavy lorries and buses.
- Emissions from the residential sector decreased by 26% since 1990 partly due to a change in the fuel mix from coal towards natural gas and also energy efficiency measures. Emissions between 2014 and 2015 increased by 2% mainly as a result of an increased demand for heating.
- Emissions from the business sector reduced by 35% since 1990, with a 7% reduction between 2014 and 2015. The trends in this sector are primarily driven by the activities from the iron and steel industry.
- Emissions from the public sector reduced by 57% since 1990. This is due to increased energy efficiency measures and fuel switching from more carbon-intensive fuels such as coal and oil to natural gas. Emissions between 2014 and 2015 increased by 2%.
- Emissions from the industrial process sector decreased by 2% since 1990 and have shown significant fluctuations during this timeframe reflecting manufacturing output and abatement installations. The trend is heavily influenced by iron and steel production.
- Emissions from the agricultural sector reduced by 15% since 1990 mainly due to a decrease in livestock numbers. There was a small increase of 1% in emissions from 2014 to 2015 mainly due to an increase in the number of dairy cattle and sheep.
- Emissions from the waste management sector significantly declined by 72% since 1990, largely due to the progressive introduction of methane capture and oxidation systems within landfill management. Emissions continued to fall between 2014 and 2015, decreasing by 1%.

<sup>299</sup> Ricardo Energy & Environment for the Department of Energy and Climate Change, The Scottish Government, The Welsh Government and The Northern Ireland Department for Agriculture, Environment and Rural Affairs (2017) *Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990 – 2015. 2017*. Available online at: [http://naei.defra.gov.uk/reports/reports?report\\_id=932](http://naei.defra.gov.uk/reports/reports?report_id=932)

## Climatic Factors

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The Welsh Government's ***Sustainable Development and Climate Change Annual Report (2016)***<sup>300</sup> provides the official overview of greenhouse gas emissions trends and determines the progress made in reducing greenhouse gas emissions in Wales against pre-defined targets, namely to reduce emissions by 3% annually in areas of devolved competence and to reduce overall emissions by 40% by 2020.

The baseline emissions figure for the 3% annual reduction target is 34.53 MtCO<sub>2</sub>e. In 2013, the emissions were 29.46 MtCO<sub>2</sub>e which equates to a decrease from the baseline of 14.7%. This reduction is therefore in excess of the 3% reduction target of 9% for 2013. The most significant reductions occurring in waste (-14.5%) and the devolved public (-13.6%) sectors.

With regards to the 40% reduction target in overall emissions, emissions in Wales have declined from the baseline to 50.76 MtCO<sub>2</sub>e in 2013. This represents an 11.9% reduction in total emissions since the baseline. It also shows that in 2013 emissions in Wales rose by 10.3% compared with 2012 driven predominantly by an increase in emissions from the iron and steel sector due to the restart of Tata Steel's Port Talbot No.4 Blast Furnace in February 2013, and a shift from natural gas to coal use in power stations.

## 10.4 Summary of Existing Problems Relevant to the Water Resources NPS

The following existing problems for climatic factors have been identified:

- The input of greenhouse gasses (e.g. CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, O<sub>3</sub>) resulting from fossil fuel usage, agriculture and other land use have been linked with atmospheric warming and undesirable climate change.
- Fossil fuel dependency remains high and is likely to remain so for some time.
- Legally binding EU and government targets (see: the Climate Change Act 2008 and subsequent revisions: The Climate Change Act 2008 (2020 Target, Credit Limit and Definitions) Order 2009, The Carbon Budgets Order 2009) seek to reduce emissions (based on a carbon budget of MtCO<sub>2</sub> equivalent) by 80% on 1990 levels by 2050, with an interim target of 34% by 2020.
- Changes in temperature and rainfall patterns, along with more frequent extreme weather events creates the situation where a greater degree of resilience will have been incorporated into plans and proposals.
- The UK's Climate Projections (UKCP09) show that the UK as a whole is likely to experience hotter, drier summers, warmer, wetter winters and rising sea levels, particularly in the south east of England. This is likely to have a significant effect on a range of environmental conditions, including the water environment.
- Sensitive ecosystems and UK water resources are likely to come under increasing pressure as a result of climate change.

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<sup>300</sup> Welsh Government (2016) *Sustainable Development and Climate Change Annual Report*. Available online at: <http://gov.wales/docs/desh/publications/160315-sustainable-development-and-climate-change-annual-report-2015-en.pdf>

## Climatic Factors

### 10.5 Likely Evolution of the Baseline

#### UK

##### Climate

UKCP09 provides the following predictions on changes to climate within the UK based on a medium emission scenario with 90% probability<sup>301</sup>:

- 2080 mean winter temperature: the central estimates of change are projected to be generally between 2 and 3°C across most of the country, with slightly larger changes in the south-east and slightly smaller in the north-west of Britain;
- 2080 mean summer temperature: a more pronounced south to north gradient exists with changes in some parts of southern England being just over 4°C and in parts of northern Scotland about 2.5°C;
- 2080 mean summer daily maximum temperature: central estimates show a gradient between parts of southern England, where they can be 5°C or more, and northern Scotland, where they can be somewhat less than 3°C;
- 2080 mean annual precipitation: shows little change (few percent or zero);
- 2080 mean winter precipitation: increases are in the range +10 to +30% over the majority of the country. Increases are smaller than this in some parts of the country, generally on higher ground;
- 2080 mean summer precipitation: general south to north gradient, from decreases of almost 40% in south west England to almost no change in Shetland;
- The range of absolute sea level rise around the UK (before land movements are included) and across the three emissions scenarios is projected to be between 12 and 76cm for the period 1990-2095, which is a wider spread than that of the global average;
- The projected long-term future trends in storm surge found in UKCP09 are physically small everywhere around the UK, and in many places can be accounted for by natural variability. The surge level is expected to be exceeded on average once in 2, 10, 20 or 50 years is not projected to increase by more than 9cm by 2100 anywhere around the UK coast (not including the mean sea level change). The largest trends are found in the Bristol Channel and Severn Estuary;
- Seasonal mean and extreme waves are generally expected to increase in the south west of the UK, reduce to the north of the UK and experience a small change in the southern North Sea. Changes in the winter mean wave height are projected to be between -35 and +5cm. Changes in the annual maxima are projected to be between -1.5 and +1m.

It is anticipated that a new set of climate change projections (UKCP18) will become available in 2018<sup>302</sup>.

<sup>301</sup> UK Climate Projections (2014) *Maps and key findings*. Available online at: <http://ukclimateprojections.defra.gov.uk/21708#key>

<sup>302</sup> UK Climate Projections (2016) *UKCP18 Project*. Available online at: <http://ukclimateprojections.metoffice.gov.uk/24126>

## Climatic Factors

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**Figure 10.1, Figure 10.2** and **Table 10.1** present projections for summer and winter temperature and precipitation for the 2050s (2040-2069) by administrative region, as defined in Murphy et al. (2009). Though impractical to reproduce all the relevant figures here, please refer to the UKCP09 technical website<sup>303</sup> for more information.

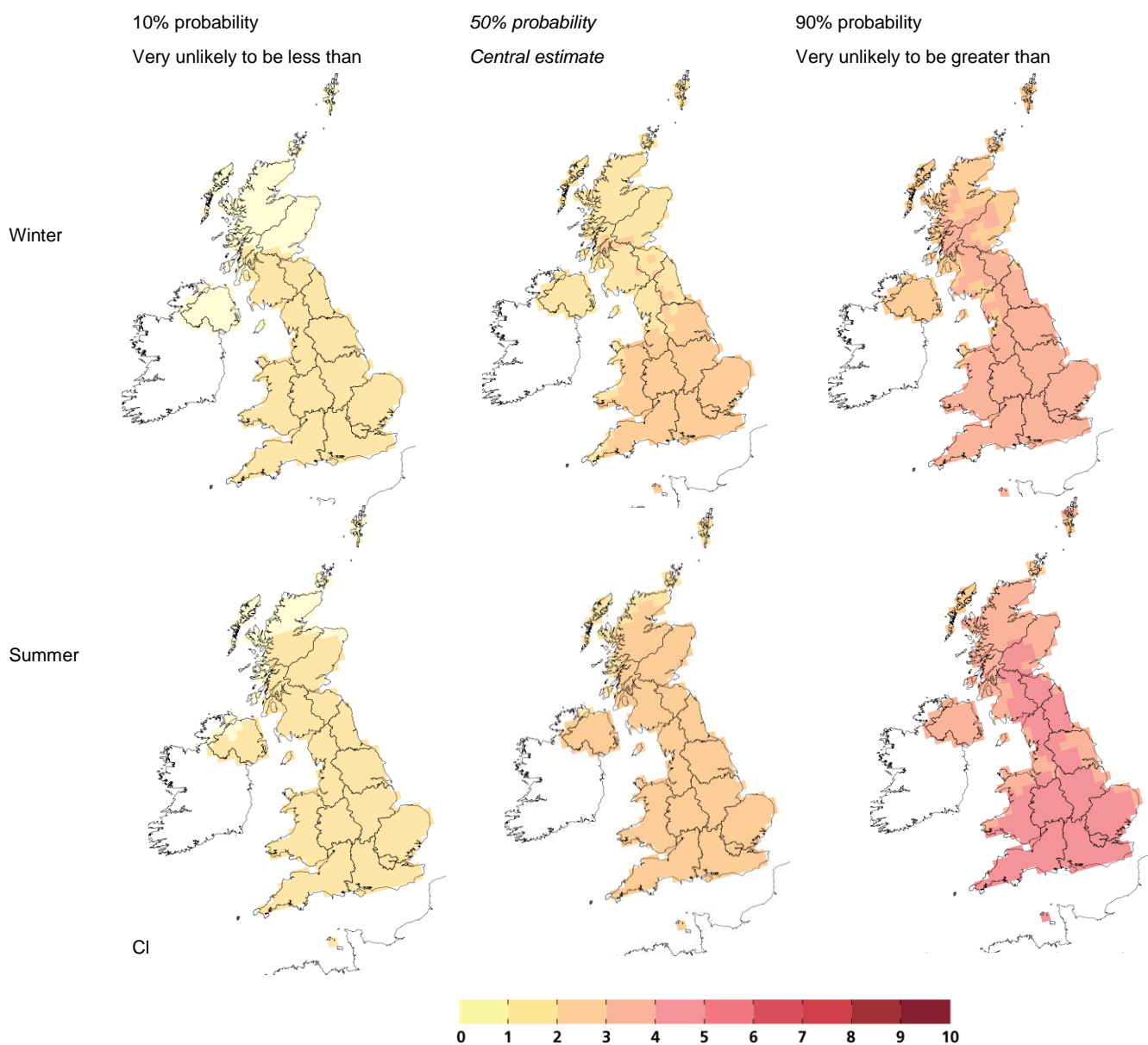
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<sup>303</sup> UK Climate Projections (2014) *Maps and key findings*. Available online at: <http://ukclimateprojections.defra.gov.uk/21708#key>



## Climatic Factors

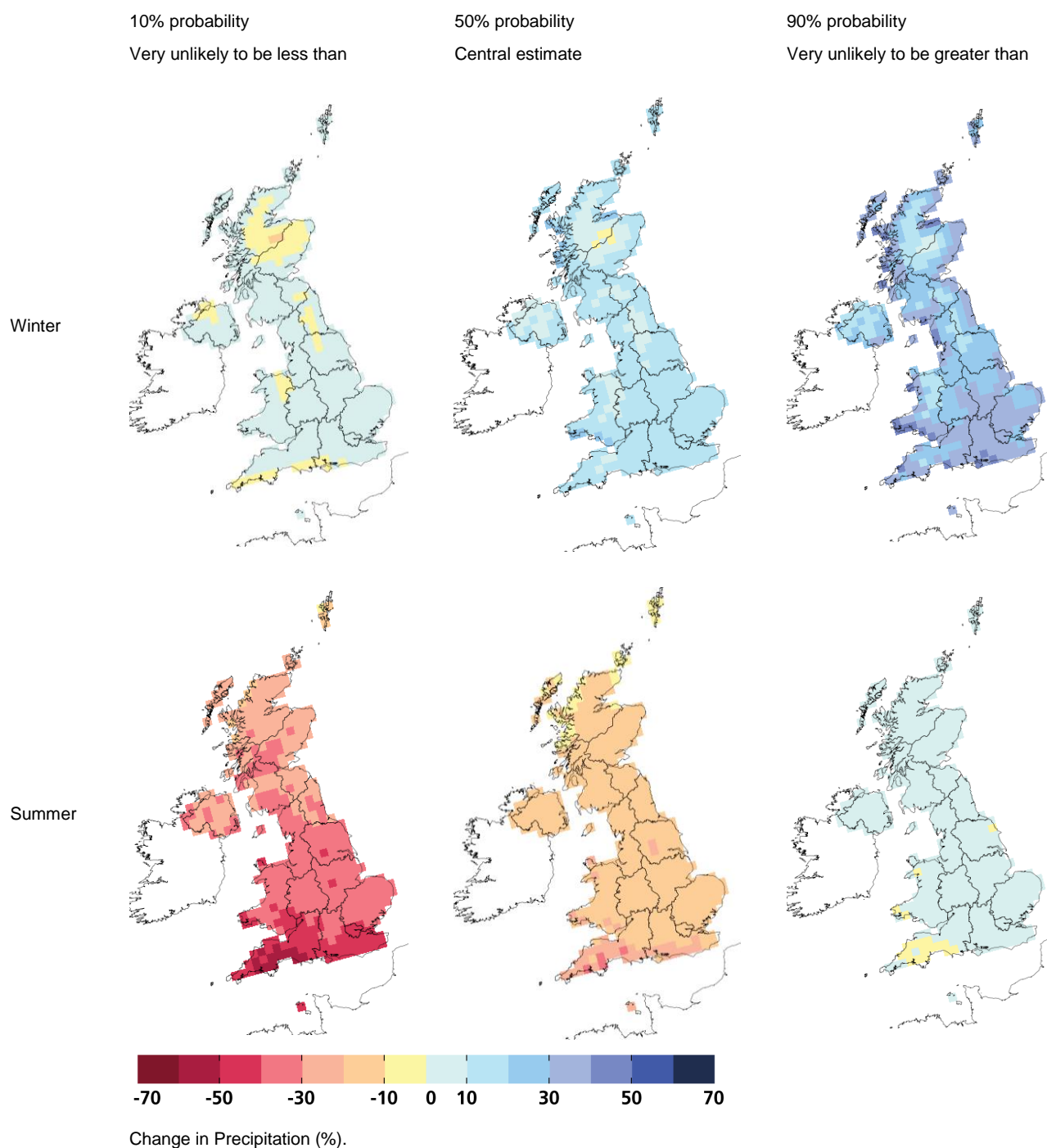
Figure 10.1 Mean Seasonal Probabilistic Temperature Projections for the 2050s, based on the Medium Emissions Scenario



Source: UK Climate Projections 2009 (<http://ukclimateprojections-ui.defra.gov.uk/ui/>).

## Climatic Factors

Figure 10.2 Mean Seasonal Probabilistic Precipitation Projections for the 2050s, based on the Medium Emissions Scenario



Source: UK Climate Projections 2009 (<http://ukclimateprojections-ui.defra.gov.uk/ui/>).

## Climatic Factors

Table 10.1 Highest and Lowest Changes in Mean Summer and Winter Temperature (°C) and Precipitation (%) by the 2050s, Relative to 1961–1990 for the Medium Emissions Scenario

Variable	Mean Winter Temperature			Mean Summer Temperature			Mean Winter Precipitation			Mean Summer Precipitation		
	10	50	90	10	50	90	10	50	90	10	50	90
Probability level (%)	10	50	90	10	50	90	10	50	90	10	50	90
North Scotland	0.6	1.7	2.8	0.9	2	3.4	3	13	24	–23	–10	2
East Scotland	0.7	1.7	2.9	1.1	2.3	3.9	2	10	20	–26	–12	1
West Scotland	1.0	1.9	3.0	1.1	2.4	3.8	5	15	28	–26	–12	1
NE England	1.0	2.0	3.1	1.2	2.5	4.1	1	11	24	–29	–14	1
NW England	1.0	2.0	3.0	1.2	2.6	4.1	3	13	26	–34	–17	1
Yorkshire & Humber	1.1	2.1	3.3	1.1	2.3	3.9	2	11	24	–35	–17	1
East Midlands	1.1	2.2	3.4	1.2	2.5	4.2	2	14	29	–35	–15	6
West Midlands	1.2	2.1	3.2	1.2	2.6	4.4	2	13	28	–36	–16	6
Wales	1.1	2.0	3.1	1.2	2.5	4.1	2	14	30	–36	–16	6
East England	1.1	2.2	3.4	1.2	2.5	4.3	3	14	31	–37	–16	6
London	1.2	2.2	3.5	1.3	2.7	4.6	2	15	33	–39	–18	7
SE England	1.1	2.2	3.4	1.3	2.7	4.6	2	16	36	–40	–18	7
SW England	1.1	2.1	3.2	1.3	2.7	4.6	4	17	38	–41	–19	7

Source: UK Climate Projections 2009 (<http://ukclimateprojections-ui.defra.gov.uk/ui/>).

## Greenhouse Gas Emissions

The Climate Change Act 2008 was passed in November 2008 and created a new approach to managing and responding to climate change in the UK. This included putting in place legally binding targets with the aim of reducing emissions by at least 80% by 2050 (compared to 1990 levels) and a set of five-year carbon budgets (legally binding limits on the total quantity of greenhouse gas emissions that the country produces over a five-year period) to 2022. The UK Government has confirmed its intention within the Fifth Carbon Budget to reduce UK greenhouse gas emissions by 57% by 2030 relative to 1990 levels.

**The Carbon Plan: Delivering our Low Carbon Future (2011)**<sup>304</sup> explains that if the UK is to cut emissions by 80% by 2050, there will have to be major changes in how energy is generated and used. In particular:

- energy efficiency will have to increase dramatically across all sectors;
- the oil and gas used to drive cars, heat buildings and power industry will, in large part, need to be replaced by electricity, sustainable bioenergy, or hydrogen;
- electricity will need to be decarbonised through renewable and nuclear power, and the use of carbon capture and storage (CCS);

<sup>304</sup> DECC (2011) *The Carbon Plan: Delivering our low carbon future*. Available online at: <https://www.gov.uk/government/publications/the-carbon-plan-reducing-greenhouse-gas-emissions--2>

## Climatic Factors

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- the electricity grid will be larger and smarter at balancing demand and supply. In the next decade, the UK is expected to complete the installation of proven and cost effective technologies that are worth installing under all future scenarios;
- all cavity walls and lofts in homes, where practicable, are expected to be insulated by 2020;
- the fuel efficiency of internal combustion engine cars will improve dramatically, with CO2 emissions from new cars set to fall by around a third;
- many of our existing coal-fired power stations will close, replaced primarily by gas and renewable;
- more efficient buildings and cars will cut fuel costs; and
- more diverse sources of electricity will improve energy security and reduce exposure to fossil fuel imports and price spikes.

As part of this evolution, under the Renewable Energy Directive (2009/28/EC) the UK is committed to delivering 15% of its energy from renewable sources by 2020.

## England

### Climate

UKCP09 provides the following changes in climate for England in 2080 based on a medium emission scenario with 90% probability:

- 2080 mean winter temperature: a change in temperature from 4.0°C in the northwest to 4.7°C in the south and east of England;
- 2080 mean summer temperature: a change in temperature from 5.4°C in Yorkshire to 6.5°C in the south east;
- 2080 mean winter precipitation: increases are in the range 41% in the east midlands to 54% in the south west; and
- 2080 mean summer precipitation: no change is expected in Yorkshire to a 7% increase in the south east and London.

## Scotland

### Climate

UKCP09 provides the following predictions on changes in climate for Scotland in 2080 based on a medium emission scenario with 90% probability:

- 2080 mean winter temperature: a change in temperature from 3.6°C to 4.0°C;
- 2080 mean summer temperature: a change in temperature from 4.9°C to 5.7°C;
- 2080 mean winter precipitation: increases are in the range 25% to 42%; and
- 2080 mean summer precipitation: increases are in the range 1-4%.

## Climatic Factors

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### Greenhouse Gas Emissions

The Climate Change (Scotland) Act 2009 sets an interim 42% reduction target for greenhouse gases by 2020, increasing to 80% by 2050 on 1990 levels, whilst associated Orders set out annual targets to ensure steady progress towards the 2050 target. This covers the basket of greenhouse gases recognised by the UNFCCC and includes Scotland's share of emissions from international aviation and international shipping.

## Wales

### Climate

UKCP09 provides the following predictions on changes in climate in Wales for 2080 based on medium emission scenario with 90% probability:

- 2080 mean winter temperature: a change in temperature of 4.2°C;
- 2080 mean summer temperature: a change in temperature of 5.8°C;
- 2080 mean winter precipitation: increases of 42%; and
- 2080 mean summer precipitation: increases of 5%.

### Greenhouse Gas Emissions

Part 2 of the **Environment (Wales) Act 2016** establishes a statutory framework for action on climate change, including targets for reducing emissions of greenhouse gases and associated duties. The Welsh Ministers are required to ensure that the 'net Welsh emissions account' for the year 2050 is at least 80% lower than the baseline, set at 1990 emissions levels, and they must also specify in regulations interim targets for 2020, 2030 and 2040 and set five yearly carbon budgets.

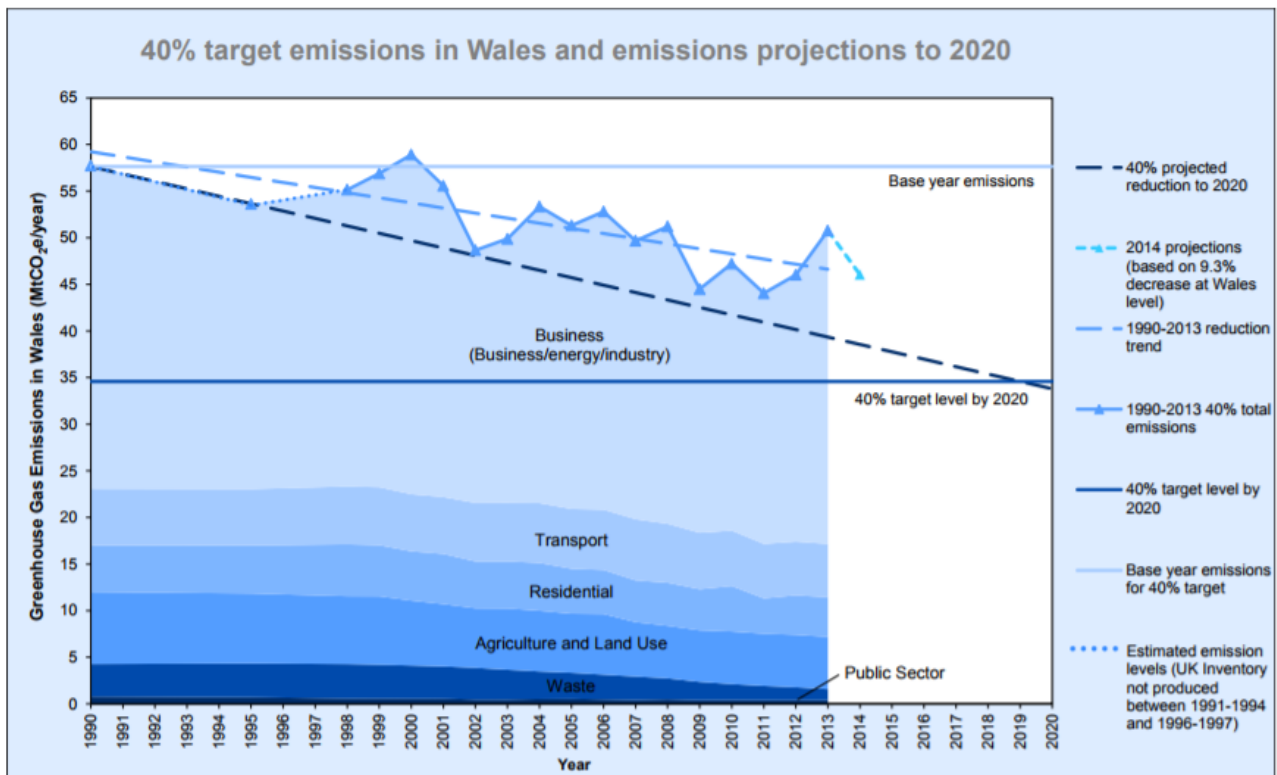
The Welsh Government also intends to achieve at least a 40% reduction by 2020 compared to figures from 1990. This target is measured against a baseline of average emissions between 2006 and 2010. The 3% target includes all 'direct' greenhouse gas emissions in Wales except those from heavy industry and power generation. Those installations are covered by the EU Emissions Trading Scheme (EU ETS). They have set target ranges for the minimum level of emission reduction they would expect to see from each sector by 2020.

- public sector reduced to a maximum of 0.83 MtCO<sub>2</sub>e, against a baseline of 1.13 MtCO<sub>2</sub>e;
- business emissions (that fall within Wales' 3% target) reduced to between 8.33 and 10.30 MtCO<sub>2</sub>e, against a baseline of 11.24 MtCO<sub>2</sub>e;
- transport emissions reduced to between 5.21 and 5.78 MtCO<sub>2</sub>e, against a baseline of 7.14 MtCO<sub>2</sub>e;
- agriculture and land use emissions reduced to between 4.07 and 4.97 MtCO<sub>2</sub>e, against a baseline of 5.57 MtCO<sub>2</sub>e;
- residential emissions reduced to between 5.46 and 6.04 MtCO<sub>2</sub>e, against a baseline of 7.48 MtCO<sub>2</sub>e; and
- waste emissions reduced to between 0.64 and 0.95 MtCO<sub>2</sub>e, against a baseline of 1.30 MtCO<sub>2</sub>e.

## Climatic Factors

**Figure 10.3** shows the projected emissions for Wales and progress against the target of a 40% reduction in emissions compared to the 1990 baseline. Whilst anticipating a reduction in emission for future years, the overall trend in the reduction of emissions is not sufficient to meet the 40% target. This is attributed to an increase in emissions from the restart of Tata Steel's Port Talbot No.4 Blast Furnace in February 2013 and a shift from natural gas to coal use in power stations<sup>305</sup>. It should be noted however that Welsh Ministers must set in regulation before the end of 2018 the interim targets (for 2020, 2030 and 2040) and first two carbon budgets covering the periods 2016- 2020 and 2021- 2025 respectively<sup>306</sup>, which may further reduce emissions beyond current trends.

Figure 10.3 Emissions projections for Wales



## 10.6 Assessing Significance

The objectives and guide questions related to climate change which have been identified for use in the appraisal of the effects of Water Resources NPS proposals are set out in **Table 10.2**, together with reasons for their selection.

<sup>305</sup> Welsh Government (2016) *Sustainable Development and Climate Change Annual Report*. Available online at: <http://gov.wales/docs/desh/publications/160315-sustainable-development-and-climate-change-annual-report-2015-en.pdf>

<sup>306</sup> Welsh Government (2017) *Decarbonisation Programme: Newsletter June 2017*. Available online at: <http://gov.wales/docs/desh/publications/170531-decarbonisation-programme-newsletter-en.pdf>

## Climatic Factors

Table 10.2 Approach to Assessing the Effects of the Water Resources NPS on Climatic Factors

Objective/Guide Question	Reasoning
<b>Objective: To minimise greenhouse gas emissions as a contribution to climate change and ensure resilience to any consequences of climate change.</b>	<p>The SEA Directive (2001/42/EC) requires that the likely significant effects on the environment, which includes population, human health, climatic factors, material assets and their integration, should be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.</p> <p>The availability of additional water supplies can increase the resilience of the existing water network and support adaptation to the effects of climate change such as drought. The construction and operation of large scale water resources infrastructure is likely to result in an increase in energy use and greenhouse gas emissions. Water resources infrastructure may be vulnerable to the effects of climate change such as flood risk and coastal change. The inclusion of this AoS objective ensures that these can be considered within the AoS.</p>
Will the Water Resources NPS help to ensure a low carbon design solution to the construction and operation of water resources infrastructure?	Government legislation (Climate Change Act 2008; Flood & Water Management Act 2010) and strategies seek to address the causes and consequences of climate change, minimising harmful emissions and investing in infrastructure that will help limit the consequences of climate change on life, property and other environmental indicators considered as part of this assessment. Government legislation (under international agreements) commits to the progressive reduction in CO <sub>2</sub> and other greenhouse gas emissions.
Will the Water Resources NPS increase resilience to the effects of climate change?	The Environment Agency's 2011 'Case for Change' considered the implications of climate change for water supplies regionally and nationally and concluded that while demand management will have an important role, significant new water resources will be needed to meet future needs. Water UK's 2016 'Water resources long term planning framework (2015-2065)' noted the importance of strategic schemes to provide future resilience. The Government confirmed in its 'Consultation on the Government's Strategic Priorities for Ofwat: Affordable, Resilient Water Supplies' (2017) that a strategic objective for Ofwat is to further a reduction in the long-term risk to water supply resilience from drought and other factors, through a range of measures including new supply solutions.
Will the Water Resources NPS lead to an increase in energy use?	Water resource management can be energy intensive, leading to the potential for increased greenhouse gas emissions.
Will the Water Resources NPS affect the ability of species or habitats to adapt to a changing climate?	There are various mechanisms by which species may be able to adapt to climate change, for example by varying in distribution and location. The degradation of certain habitats may affect species' ability to adapt to climate change.
Will the Water Resources NPS promote climate change adaptation (including rising temperatures and more extreme weather events)?	UKCP09 scenarios show that increasing temperatures and changes to precipitation, increased storminess and extreme weather is expected, which has the potential to impact on the proposals.

**Table 10.3** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the climatic factors objective.



## Climatic Factors

Table 10.3 Illustrative Guidance for the Assessment of Significance for Climate Change

Effect	Description	Illustrative Guidance
++	Significant Positive	<ul style="list-style-type: none"> <li>Option would help to significantly reduce carbon and other greenhouse gas emissions;</li> <li>Option would significantly increase resilience/decrease vulnerability to climate change in the water supply and wider environment.</li> </ul>
+	Positive	<ul style="list-style-type: none"> <li>Option would help to reduce carbon and other greenhouse gas emissions;</li> <li>Option would increase resilience/decrease vulnerability to climate change in the water supply and wider environment.</li> </ul>
0	Neutral	<ul style="list-style-type: none"> <li>Option would not lead to an overall change in carbon and other greenhouse gas emissions and would not contribute to climate change or resilience to climate change within the wider environment.</li> </ul>
-	Negative	<ul style="list-style-type: none"> <li>Option would increase carbon and other greenhouse gas emissions;</li> <li>Option would decrease resilience/increase vulnerability to climate change in the water supply and wider environment.</li> </ul>
--	Significant Negative	<ul style="list-style-type: none"> <li>Option would significantly increase carbon and other greenhouse gas emissions;</li> <li>Option would significantly decrease resilience/increase vulnerability to climate change in the water supply and wider environment.</li> </ul>
?	Uncertain	<ul style="list-style-type: none"> <li>From the level of information available, the effect that the option would have on this objective is uncertain.</li> </ul>

## Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 10.4** presents the appraisal of the likely significant effects of the draft NPS and the 'no NPS' alternative on the climatic factors objective. The appraisal considers in-turn the three sub-sections used for each topic within Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making and Mitigation. The performance of the draft NPS and the 'no NPS' alternative are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters 1 – 3 of the draft NPS outlining how the remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the 'no NPS' alternative is then summarised along with any proposed mitigation measures.



## Climatic Factors

Table 10.4 Appraisal of the Draft NPS and Reasonable Alternatives: Climatic Factors

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	+	+/?	<p><b>Draft NPS:</b> The text in the draft NPS under 'Applicant's Assessment' states:</p> <p>4.4.4 "While it is unlikely that the development of water resources infrastructure will adversely affect the government's ability to meet its emissions targets, the applicant should provide evidence of the carbon impact of the development and an assessment of emissions associated with construction and operation against government targets."</p> <p>4.4.5 "Where a proposed development is EIA development under the EIA Regulations, the applicant should undertake an assessment of the project as part of the environmental statement, to include an assessment of any likely significant climate effects. The applicant should provide evidence of the carbon impact of the project (including embodied carbon), both from construction and operation, such that it can be assessed against the government's carbon obligations, including but not limited to carbon budgets."</p> <p>The consideration of the carbon impacts of scheme options and the subsequent assessment of climate change effects will help to ensure that climate change mitigation and adaptation are duly taken into account by applicants, that effects are fully identified and that appropriate mitigation measures are implemented. Overall, there are likely to be positive effects on this AoS objective.</p> <p><u>Recommendations for improvement</u></p> <p>The Applicant's Assessment could require that applicants demonstrate that the development proposal (including both surface and underground infrastructure, such as pipelines) is resilient and adaptable to a changing climate over its operational lifetime.</p> <p>It would be useful for the text in this section to make direct reference to the Planning Practice Guidance (PPG) on how planning can deal with the uncertainty of climate risks when promoting adaptation in developments (PPG Climate Change). Consideration should also be given to providing further guidance on the possible contents of the ES with regards to climatic factors. The specification of the contents of the ES could be drawn from the following:</p> <ul style="list-style-type: none"> <li>• Scoping <ul style="list-style-type: none"> <li>○ Evaluate existing greenhouse gas emissions (where relevant).</li> <li>○ Describe any future anticipated changes to baseline conditions in the absence of the proposed project, to inform the assessment of impacts.</li> <li>○ Provide the basis for determining the significance of effects including assessment methods.</li> </ul> </li> </ul>

## Climatic Factors

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>Impact assessment <ul style="list-style-type: none"> <li>Any modelling or detailed quantification of a project's greenhouse gas emissions through its construction and operation should be presented, as relevant, within an appendix, which should be cross-referenced from a description of its findings that is contained in the main ES. If an Energy Statement is required, it should be included within the ES to be considered good practice; as a minimum the ES must effectively summarise and cross reference its findings.</li> <li>Any mitigation, compensation or monitoring related to a proposed development's GHG emissions (though it's construction and operation) should be included in a draft Environmental Management Plan (EMP), within the ES. If appropriate, the measures should be written to allow the consenting authority to condition the activity specified.</li> <li>Assess any significant climate change effects associated with the development, distinguishing between the project stages, and taking account of any significant emissions from any traffic generated by the project.</li> <li>Assess the residual impacts of the project remaining after mitigation and the significance of their effects, including cumulative effects.</li> </ul> </li> <li>Avoidance, mitigation, compensation and enhancement <ul style="list-style-type: none"> <li>Identify and incorporate measures to avoid, reduce and compensate impacts on climate change. Additional or new actions that could be taken to minimise emissions should be factored into the project post consent as appropriate, with the newly operational site considering implementing an Environmental Management System (EMS) to effectively manage its greenhouse gas emissions.</li> <li>Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures,</li> </ul> </li> </ul> <p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and EIA Regulations. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on climatic factors.</p> <p>However, the absence of a clear statement on the full range of information to be submitted with regards to climatic factors in the ES (as proposed in the draft NPS) risks development not effectively mitigating climatic impacts. However, this reasonable alternative would still be considered to have a positive effect against this AoS objective, although a degree of uncertainty persists.</p>

## Climatic Factors

Draft NPS Section	Draft NPS	No NPS	Appraisal
Decision Making	+	+/?	<p><b>Draft NPS:</b> The draft NPS stipulates that, should the development of new water resources infrastructure result in an increase in carbon emissions, this will not be considered a reason to refuse development consent unless the resulting increase in carbon emissions is so significant that it would have a material impact on the Government's ability to reach its carbon reduction targets, including carbon budgets.</p> <p>This is expected to have a positive effect for climatic factors.</p> <p><u>Recommendations for improvement</u></p> <p>The draft NPS could state that the Secretary of State should refuse development consent if the applicant fails to show that they have considered the impact of climate change over the operation lifetime of the proposed development and not given consideration to the adaptability to a range of potential future climatic environments.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and EIA which would require consideration of effects on climatic factors. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on climatic factors. In consequence, even without the NPS, this alternative would still be considered to have a positive effect in relation to climate change. However, the absence of a clear statement of the full range of considerations to be taken into account by the Secretary of State (as proposed in the draft NPS) risks inconsistency in interpretation, particularly with regard to the absence of a clear statement on the role of the Secretary of State when assessing carbon emissions and reasons for refusing development consent.</p>
Mitigation	+	+/?	<p><b>Draft NPS:</b> The draft NPS stipulates that the design of the infrastructure, including configuration and layout and use of materials, should be considered in terms of the carbon emissions impact (within safety and operational constraints). It states that the Secretary of State will consider the effectiveness of such mitigation measures in order to ensure that the carbon footprint is as low as reasonably practicable, in relation to design and construction. The Secretary of State's view of the adequacy of the mitigation measures relating to design and construction will be a material factor in the decision making process. It also requires the applicant to demonstrate that it has investigated feasible options in terms of using energy efficient technology or processes, or using renewable energy sources, produced either on site or linked to any local renewable energy initiatives (paragraph 4.4.7).</p> <p>Overall, this has been assessed as having a positive effect on this AoS objective, although it is noted that no mitigation measures are identified in this section of the draft NPS relating to climate change adaptation.</p> <p><u>Recommendations for Improvement</u></p> <p>To inform the appraisal of this section of the draft NPS, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on climatic factors has been undertaken. This review is intended to help identify where any additional measures could be included in the draft NPS (in the</p>

## Climatic Factors

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>introduction or mitigation section of the topic) to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p> <p>The following text identifies the anticipated climate change impacts and mitigation measures. These have been largely identified within the draft NPS and are discussed again here to ensure that the description of impacts is clear and provides the necessary context for the recommended mitigation measures. Where impacts discussed here have not been included within the draft NPS, they have been clearly identified.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p> <p><i>Construction</i></p> <p>As noted in the draft NPS, it is expected that the scale of construction required for the enlargement of existing, or construction of new, reservoirs will generate high levels of emissions of greenhouse gases from HGV movements, construction plant and the embodied carbon in raw materials.</p> <p><i>Operation</i></p> <p>As noted in the draft NPS, once operational, reservoirs will result in some energy use and generate associated greenhouse gas emissions, mainly associated with the pumping of water and a small number of vehicles movements. There may also be emissions arising from the operation of any associated infrastructure.</p> <p>In addition, in respect of flood risk and coastal change, new or enlarged reservoirs may provide an opportunity to address flood risk issues (for example, by providing extra space for flood water storage and increasing monitoring and control of flows). This may help to enhance resilience to the effects of climate change. Additionally, in the long term, a reservoir water body could act as a sink for industrial emissions and could result in beneficial changes to the local microclimate such as reduced temperatures.</p> <p>Enhanced resilience in supply associated with this infrastructure type would be expected to reduce the requirements for drought restrictions.</p> <p><b>Water Transfer Schemes</b></p> <p><i>Construction</i></p> <p>As per the construction impacts for reservoirs.</p> <p><i>Operation</i></p> <p>Effects on energy use are as per the operational impacts for reservoirs.</p> <p>In addition to the effects identified in the draft NPS, enhanced resilience in supply associated with this infrastructure type would be expected to reduce the requirements for drought restrictions.</p>

## Climatic Factors

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>Desalination</b></p> <p><i>Construction</i></p> <p>As per the construction impacts for reservoirs.</p> <p><i>Operation</i></p> <p>As noted in the draft NPS, desalination is energy intensive and in consequence, operational emissions are likely to be significant. There may also be additional emissions associated with the ongoing pumping and treatment of water.</p> <p>In addition to the effects identified in the draft NPS, enhanced resilience in supply associated with this infrastructure type would be expected to reduce the requirements for drought restrictions.</p> <p><b>Potential additional mitigation measures identified through a review draft WRMPs and their associated SEA Environmental Reports include:</b></p> <ul style="list-style-type: none"> <li>• Where landscaping is required, appropriate planting should be utilised that is adaptable to a changing climate.</li> <li>• The design and siting of new water infrastructure schemes should maximise energy efficiency and be adaptable to the anticipated effects of climate change.</li> <li>• Consider opportunities to minimise CO<sub>2</sub> emissions associated with staff travel, including provision of alternative modes of transport.</li> </ul> <p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and EIA which would require consideration of the effects on climatic factors. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on climatic factors. In consequence, even without the NPS, this alternative would still be considered to have a positive effect in relation to climate change, although a degree of uncertainty persists.</p>
<b>Other Sections of the Draft NPS Relevant to Climatic Factors</b>	<p>The following provides additional commentary on the text in other sections of the draft NPS relevant to climatic factors. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b><u>1. Introduction</u></b></p> <p><b>1.1. Background and scope of this NPS</b> – reference to the AoS prepared in support of the draft NPS will help to ensure that the effects on climate change are given proper consideration, notwithstanding the fact that there remains uncertainty over potential impacts, particularly in respect of the absence of specific locations and likely effects within the draft NPS.</p>		

## Climatic Factors

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<p>With regard to para 1.1.8, there is an opportunity for the consideration of climatic factors in a specific locality through the preparation of a local impact report submitted by a local authority in accordance with the Planning Act 2008.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on climatic factors in Scotland and Wales.</p> <p><b><u>2. Government policy and the need for water resources infrastructure</u></b></p> <p><b>2.2 Pressure on water availability now and in the future</b> – this section makes specific reference to climate change as a key driver of the need for nationally significant water resources infrastructure.</p> <p><b>2.3. A twin track approach to resilient water supplies</b> - this section identifies the importance of securing resilience (including in respect of droughts) in the context of a twin track approach.</p> <p><b>2.5. The role of water resource management plans in identifying the need water</b> – as noted, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on climatic factors. This is reflected in paragraph 2.5.7.</p> <p><b>2.6 The role of nationally significant infrastructure projects</b> – this section identifies that alongside reservoirs, water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP, when assessed against the relevant threshold in the Planning Act 2008 or through a section 35 referral. These infrastructure types may have impacts on climatic factors of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p> <p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p><b><u>3. Assessment Principles</u></b></p> <p><b>3.1 General principles of assessment</b> - the provisions of the Planning Act 2008 and the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, provides the starting point for the consideration of climatic factors.</p> <p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on climatic factors.</p> <p><b>3.2 Environmental Impact Assessment</b> – the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that climatic factors are fully considered, as will the consideration of cumulative effects and interrelationships between effects.</p>		

## Climatic Factors

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<p>This section specifically highlights that information gathered from the WRMP options assessments and the draft NPS will also be useful to identify the significant effects of a proposed project.</p> <p><b>3.5 Assessing Alternatives</b> – the requirement that reasonable alternatives will need to be considered as part of scheme design and project planning, including as part of the WRMP options appraisal process, should ensure that climatic factors are taken into account.</p> <p><b>3.6 Criteria for ‘good design’ for water resources infrastructure</b> – applying ‘good design’ to water resources infrastructure will support the development of sustainable infrastructure which is efficient in the use of natural resources and energy and which should have a positive effect upon minimising emissions and promoting climate change resilience. Similarly, the Planning Act gives importance to sustainability and the Secretary of State needs to be satisfied that development adheres to the principles of sustainable development.</p> <p><b>3.7 Climate change adaptation</b> – sets out that the Planning Act requires the Secretary of State to have regard to the desirability of mitigating, and adapting to, climate change in designating and reviewing a NPS. The Secretary of State should also take the effects of climate change into account when consenting new water infrastructure. Adaptation of development is necessary to deal with the potential impacts of climate change over the operational lifetime of the infrastructure. The ES should set out how the proposal will take account of the projected impacts of climate change. When preparing the ES, applicants should apply the latest climate change scenarios available at that time. The ES should set out how the proposal will take account of the projected impacts of climate change. Where adaptation measures are necessary to deal with the impact of climate change, and those measures would have an adverse effect on other aspects of the project and/or surrounding environment, the Secretary of State may require the applicant to implement adaptation measures should the need arise, rather than at the outset of development.</p> <p><b>3.10 Safety</b> – no direct relationship identified. However, the impacts of climate change will be an important consideration in determining the safety of a scheme.</p> <p><b>3.12 Health</b> – sets out that where the proposed development has an effect on people’s health, the ES should assess these effects for each element of the project, including climatic factors, identifying any adverse health impacts and mitigation measures to avoid, reduce or compensate for such impacts as appropriate.</p> <p><u>Recommendations for improvement</u></p> <p>It is recommended that Section 3.7 of the draft NPS cross refers to The Clean Growth Strategy (2017).<sup>307</sup> Chapter 4 of the strategy sets out a number of policies and proposals to assist in improving business and industry efficiency and supporting clean growth. This includes establishing an Industrial Energy Efficiency scheme and other measures intended to address climate change that new water resources infrastructure, in particular desalination, should seek to integrate into scheme design and development from the outset.</p>		

<sup>307</sup> HM Government (2017) *The Clean Growth Strategy: Leading the way to a low carbon future*. Available at: <https://www.gov.uk/government/publications/clean-growth-strategy>

## Climatic Factors

Draft NPS Section	Draft NPS	No NPS	Appraisal
Summary Appraisal of Likely Significant Effects	+	+/?	<p><b>Draft NPS:</b> New water resources infrastructure will contribute to climate change due to emissions associated with, for example, vehicle movements to and from sites, the use of powered plant, the embodied carbon within construction materials and carbon emissions associated with energy use. Desalination in particular is an energy intensive process with the consequent potential for high carbon emissions. In this context, the draft NPS seeks to ensure that the carbon impacts of development are assessed and appropriate mitigation measures implemented so as to reduce emissions. In consequence, the draft NPS should help to ensure low carbon design solutions are adopted during the construction and operational phases of proposals.</p> <p>The draft NPS also promotes climate change adaptation as part of the design of developments. This, alongside other requirements set out in the draft NPS, could help to minimise direct effects with respect to climatic factors.</p> <p>Overall, the implementation of the draft NPS is likely to result in a positive effect in respect of minimising carbon impacts and promoting climate change adaptation.</p>
			<p><b>No NPS:</b> Despite the absence of a guiding framework on climatic factors, this reasonable alternative is likely to result in positive effects overall as any development proposal would be subject to the provisions of national planning policy and the EIA Regulations and the resulting overall effects under this alternative are likely to be positive. Further, proposals would continue to be identified through the WRMP process which would include the consideration of climatic factors. However, the absence of a clear statement on the full range of information to be submitted in the ES and considered by the Secretary of State risks development not effectively mitigating carbon emissions and proposing effective adaptation. It is acknowledged that whilst mitigation measures would be forthcoming under this alternative, there is a risk that these are open to interpretation and that they may not fully address an appropriate range of activities.</p>
Summary of Recommended Mitigation and Enhancement	<p>The draft NPS makes a positive contribution to this AoS objective. However, section 4.4 of the draft NPS could be enhanced through, in particular:</p> <ul style="list-style-type: none"><li>strengthening of the linkages to the NPPF and PPG;</li><li>requiring that applicants demonstrate that development proposals are resilient and adaptable to a changing climate;</li><li>provision of further guidance on the possible contents of an ES.</li></ul> <p>Additional project-level mitigation for inclusion in the draft NPS is suggested based on a review of draft WRMPs and their associated SEA Environmental Reports. This includes:</p> <ul style="list-style-type: none"><li>Where landscaping is required, appropriate planting should be utilised that is adaptable to a changing climate.</li></ul>		



**Climatic Factors**

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<ul style="list-style-type: none"><li>• The design and siting of new water infrastructure schemes should maximise energy efficiency and be adaptable to the anticipated effects of climate change.</li><li>• Consider opportunities to minimise CO<sub>2</sub> emissions associated with staff travel, including provision of alternative modes of transport.</li></ul>		

## Waste and Resource Management

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# 11. Waste and Resource Management

## 11.1 Introduction

This section presents the overview of plans and programmes and baseline information for the appraisal of sustainability of the National Policy Statement for Water Resources Infrastructure in respect of waste and resource use.

Waste management in this context is defined as the processing, recycling or disposal of a range of waste types including municipal, commercial and industrial, construction, excavation and demolition and hazardous wastes. However, it is important to note that consideration of the management of waste links to a number of other Appraisal of Sustainability (AoS) topics, the most relevant being climate change given the potential for waste to be recovered for energy use. Resource use, meanwhile, primarily relates to minerals and raw materials with the use of water resources, soils and energy captured under the water quality, land use, geology and soils and climatic factors AoS topics.

## 11.2 Review of Plans and Programmes

The review of plans and programmes related to waste has identified two key objectives, firstly the need to minimise and manage waste in accordance with the waste management hierarchy and secondly the suitable disposal of hazardous wastes. The need to minimise and manage waste affects all industries and avoiding waste contamination in waterways is an important part of maintaining aquatic ecosystems and ensuring a safe water supply.

### International/European

At the international level, the **Basel Convention** entered into force in 1992 and is a global agreement, ratified by several member countries and the European Union, for addressing the problems and challenges posed by hazardous waste. The key objectives of the Basel Convention are:

- to minimise the generation of hazardous wastes in terms of quantity and hazardousness;
- to dispose of them as close to the source of generation as possible; and
- to reduce the movement of hazardous wastes.

The **World Summit on Sustainable Development (2002)** in Johannesburg proposed broad-scale principles which should underlie sustainable development and growth, including an objective on greater resource efficiency.

At the European Level, the **Waste Framework Directive (2008/98/EC)** provides an overarching framework of waste management requirements and sets the basic waste management definitions for the EU. This Directive repealed Directive 2006/12/EC on waste (the codified version of Directive 75/442/EEC as amended), the Hazardous Waste Directive 91/689/EEC, and the Waste Oils Directive 75/439/EEC. The revised Waste Framework Directive includes waste disposal and the protection of the environment from harmful effects caused by the collection, transport, treatment, storage and tipping of waste. It aims to encourage the recovery and use of waste in order to conserve natural resources. The key principles of the Directive include the 'Waste Management Hierarchy' which provides an environmental priority order for waste management

## Waste and Resource Management

options which are: prevention; preparing for re-use; recycling; other recovery (e.g. energy recovery); and disposal. Key objectives are to reduce the adverse impacts of the generation of waste and the overall impacts of resource use. This should be done through a variety of mechanisms, including:

- by 2020, requiring Member States to re-use and recycle 50% of their household waste (by weight) and to reuse, recycle and recover 70% of their non-hazardous construction and demolition waste (by weight);
- applying the waste hierarchy - promoting waste minimisation followed by reuse and recycling, other recovery (such as energy recovery) and disposal - as a priority order in waste prevention and management legislation and policy;
- taking measures as appropriate to promote the re-use of products and preparing for re-use activities; and
- extending the self-sufficiency and proximity principles to apply to installations for recovery of mixed municipal waste from households.

Hazardous wastes pose more of a threat to human health and the environment than do non-hazardous wastes, and consequently require more stringent controls. These are set out in particular in Articles 17 to 20 of Directive 2008/98/EC. It provides additional labelling, record keeping, monitoring and control obligations from the "cradle to the grave", i.e., from the waste producer to the final disposal or recovery. In addition, mixing of hazardous substances is banned in order to prevent threats to the environment and human health. Also, the permit exemptions that may be granted to installations dealing with hazardous wastes are more restrictive than for installations dealing with other wastes.

The approach to classifying hazardous and non-hazardous waste hinge on the system for the classification and labelling of dangerous substances and preparations, which ensures the application of similar principles over their whole life cycle. The properties which render waste hazardous are laid down in Annex III of Directive 2008/98/EC and are further specified by European Commission Decision 2000/532/EC, which establishes a List of Wastes, as last amended by European Commission Decision 2001/573/EC. A review of the List of Wastes has recently been completed and guidance on the classification and assessment of waste has been published by the UK environment agencies<sup>308</sup>.

In this context, the **Landfill Directive (1999/31/EC)** focuses on waste minimisation and increasing levels of recycling and recovery. The overall aim of the Directive is to prevent, or reduce as far as possible, negative effects on the environment (in particular the pollution of surface water, groundwater, soil and air and on the global environment, including the greenhouse effect) as well as any resulting risk to human health from the landfilling of waste, during the whole lifecycle of the landfill. The Directive sets the target of reducing biodegradable municipal waste landfilled to 35% of that produced in 1995 by 2020.

There are a number of **Producer Responsibility Directives** relating specifically to consumer products. Their purpose is to require businesses to reuse, recover and recycle waste which comes from products they produce, and each Directive sets national targets for recovery and recycling of these wastes.

The **Mining Waste Directive (2006/21/EC)** aims to prevent or reduce as far as possible the adverse effects on the environment and any resultant risks to human health from the management of waste from the

<sup>308</sup> Natural Resources Wales, SEPA, NIEA, Environment Agency (2015) *Guidance on the classification and assessment of waste (1st edition 2015) Technical Guidance WM3*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/427077/LIT\\_10121.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/427077/LIT_10121.pdf)

## Waste and Resource Management

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extractive industries (e.g. mining). The Directive sets out how to achieve this aim by providing for measures, procedures and guidance on how extractive industries should be managed.

The **Industrial Emissions Directive (2010/75/EU)** is the main EU instrument regulating pollutant emissions from industrial installations. The Directive prescribes emission limit values for certain industrial processes/plants including waste incineration, requires other emissions limit values to be based on Best Available Techniques (BAT), and introduces detailed technical and consultation requirements for permitting processes.

In addition to the above Directives a number of European level policy publications are also of relevance. In relation to general waste minimisation and management issues, the **European Sustainable Development Strategy (2006)** and the subsequent **Review of the EU Sustainable Development Strategy (2009)** identifies sustainable consumption and production as one of seven key challenges and cross-cutting themes, whilst the European Commission's **Closing the loop - An EU Action Plan for the Circular Economy** (2015) seeks to implement the Commission's long-term vision of significantly reducing waste landfilling and increasing recycling.

On September 25th, 2015, countries adopted the **17 UN Sustainable Development Goals**. These include Goal 12, to ensure sustainable consumption and production patterns with the following targets (inter alia) identified:

- By 2030, achieve the sustainable management and efficient use of natural resources;
- By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimise their adverse impacts on human health and the environment;
- By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.

## UK

In terms of relevant UK level national policy documents, the UK Government's Sustainable Development Strategy: Securing the Future and the UK's Shared Framework for Sustainable Development, One Future - Different Paths) include sustainable consumption and production as one of four priorities and consider the five guiding principles:

- living within environmental limits;
- ensuring a strong, healthy and just society;
- achieving a sustainable economy;
- using sound science responsibly; and
- promoting good governance.

## England

The revised Waste Framework Directive has been implemented by the **Waste (England and Wales) Regulations 2011** (SI 2011/988), which sets out the main statutory provisions of relevance. This has been

## Waste and Resource Management

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amended by the **Waste (England and Wales) (Amendment) Regulations 2012** and the **Waste (England and Wales) (Amendment) Regulations 2014**.

In June 2011 Defra published a **Government Review of Waste Policy in England**, which looked at the most effective ways of reducing waste, maximising the money to be made from waste and recycling and considering how waste policies affect local communities and individual households. The report set out a number of 'Principal Commitments' that aim to achieve a more sustainable approach to the use of materials, deliver environmental benefits and support economic growth. These include:

- promoting resource efficient product design and manufacture and target those waste streams with high carbon impacts, both in terms of embedded carbon (food, metals, plastics, textiles) and direct emissions from landfill (food, paper and card, textiles, wood);
- promoting the use of life cycle thinking in all waste policy and waste management decisions and the reporting of waste management in carbon terms, as an alternative to weight-based measures;
- developing a comprehensive Waste Prevention Programme and in the meantime working with businesses and other organisations across supply chains on a range of measures designed to drive waste reduction and re-use as part of a broader resource efficiency programme; and
- continuing to help local communities develop fit for purpose local solutions for collecting and dealing with household waste and working with councils to meet households' reasonable expectations for weekly collections, particularly of odorous waste.

In December 2013, the **Waste Management Plan for England (WMPE)** was released by Defra, replacing the National Waste Strategy 2007. It meets the requirements of the revised Waste Framework Directive by bringing together existing plans, policies and legislation under one umbrella. The WMPE does not set new policies or targets but refers to those from the revised Waste Framework Directive that are transposed into the **Waste (England and Wales) Regulations 2011** (SI 2011/988). It evaluates how it will support implementation of the objectives and provisions of the revised Waste Framework Directive, and fulfils Article 28 mandatory requirements which specify that the Plan should contain the following information:

- an analysis of the current waste management situation in the geographical entity concerned, as well as the measures to be taken to improve environmentally sound preparing for re-use, recycling, recovery and disposal of waste and an evaluation of how the Plan will support the implementation of the objectives and provisions of the revised Waste Framework Directive;
- the type, quantity and source of waste generated within the territory, the waste likely to be shipped from or to the national territory, and an evaluation of the development of waste streams in the future;
- existing waste collection schemes and major disposal and recovery installations, including any special arrangements for waste oils, hazardous waste or waste streams addressed by specific Community legislation;
- an assessment of the need for new collection schemes, the closure of existing waste installations, additional waste installation infrastructure in accordance with Article 16 (on the proximity principle), and, if necessary, the investments related thereto;
- sufficient information on the location criteria for site identification and on the capacity of future disposal or major recovery installations, if necessary; and

## Waste and Resource Management

- general waste management policies, including planned waste management technologies and methods, or policies for waste posing specific management problems.

The **Waste Prevention Programme for England (December 2013)** sets out the roles and actions that government, businesses, the wider public sector and civil society must play, to reduce the amount of waste produced in England.

The **National Planning Policy Framework (MHCLG, 2018)** sets out the Government's expectation for local planning authorities to set out the strategic priorities for their area in the local plan and include strategic policies to deliver the provision of infrastructure for waste management and the provision of minerals. In doing so, they should work with other relevant organisations and providers to assess the quality and capacity of infrastructure for waste and its ability to meet forecast demands.

Minerals planning authorities are expected to provide for the extraction of mineral resources of local and national importance and safeguard mineral resources by defining Mineral Safeguarding Areas; and adopt appropriate policies so that known locations of specific minerals resources of local and national importance are not sterilised by non-mineral development. The NPPF defines 'mineral resources of local and national importance' as minerals which are necessary to meet society's needs, including aggregates, brickclay, silica sand, cement raw materials, gypsum, salt, fluorspar, coal, oil and gas (including conventional and unconventional hydrocarbons) tungsten, kaolin, ball clay, potash, polyhalite and local minerals of importance to heritage assets and local distinctiveness.

In order to facilitate the sustainable use of minerals, the NPPF sets out a number of expectations relating to specific minerals for local authority plan-making and decisions on planning applications. In doing so, the Framework includes safeguards so as to ensure permitted operations do not have unacceptable adverse impacts on the natural and historic environment or human health.

**National Planning Policy for Waste (October 2014)** sets out detailed waste planning policies and is intended to be read in conjunction with the National Planning Policy Framework, the Waste Management Plan for England and National Policy Statements for Waste Water and Hazardous Waste.

**Planning Practice Guidance (October 2014)** provides guidance on the planning for mineral extraction in plan making and the application process, as well as further information in support of the implementation of waste planning policy.

Hazardous waste in England is addressed by the Hazardous Waste (England and Wales) Regulations 2005 as amended by The Hazardous Waste (England and Wales) (Amendment) Regulations 2009 and the Hazardous Waste (England and Wales) (Amended) Regulations 2016.

Defra's **Strategy for Hazardous Waste Management in England (2010)** sets out the following principles for hazardous waste management:

- waste hierarchy;
- infrastructure provision;
- reduce our reliance on landfill;
- no mixing or dilution;
- treatment of hazardous organic wastes; and
- end reliance on the use of Landfill Directive waste acceptance criteria derogations.

## Waste and Resource Management

The **National Policy Statement for Hazardous Waste (Defra, 2013)** provides the framework for decisions on proposals for new nationally significant hazardous waste infrastructure.

The **Resource Security Action Plan (Defra, 2012)** provides a framework for business action to address risks about the availability of some non-renewable raw materials (including minerals) and sets out high level actions to build on the developing partnership between Government and businesses to address resource concerns. This Action Plan emphasises the need to make best use of resources currently in use, reducing as far as practicable the quantity of material used and waste generated, and using as much recycled and secondary material as possible, before securing the remainder of material needed through new primary extraction.

**A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)** includes policies and actions relating to increasing resource efficiency and reducing waste. This includes a target to eliminate all avoidable waste by 2050 and all avoidable plastic waste by end of 2042.

### Scotland

The **revised Waste Framework Directive** has been transposed into law in Scotland through the following legislation, as amended:

- The National Waste Management Plan for Scotland Regulations 2007 (SSI 2007/251);
- The Waste Management Licensing (Scotland) Regulations 2011 (SSI 2011/228);
- The Waste (Scotland) Regulations 2011 (SSI 2011/226) and The Waste (Scotland) Regulations 2012 (SSI 2012/148); and
- Consequential amendments to existing pollution prevention/control and landfill regulations.

**Choosing our Future: Scotland's Sustainable Development Strategy 2005** reflects the five principles found within the UK Sustainable Development Strategy and includes objectives on protecting Scotland's natural heritage and resources. **Scotland's Government Economic Strategy (2015)** reaffirms the Scottish Government's commitment to delivering increased sustainable economic growth.

**Safeguarding Scotland's Resources – Blueprint for a More Resource Efficient and Circular Economy (2013)** is a programme committed to making an immediate impact in Scotland's resource consumption, encouraging a reduction in raw material use to benefit the environment and economy. **Making things Last: Consultation on creating a more circular economy in Scotland (2016)** explores the priorities for building a more circular economy – where products and materials are kept in high value use for as long as possible.

Scotland's **Zero Waste Plan (2010)** sets out the Scottish Government's vision for a zero-waste society. To achieve this vision, the Plan sets out new measures including:

- development of a Waste Prevention Programme for all wastes, ensuring the prevention and reuse of waste is central to all actions and policies;
- landfill bans for specific waste types therefore reducing greenhouse gas emissions and capturing the value from these resources;
- separate collections of specific waste types, including food, to avoid contaminating other materials, increasing reuse and recycling opportunities and contributing to renewable energy targets;



## Waste and Resource Management

- two new targets that will apply to all waste: 70% target recycled, and maximum 5% sent to landfill, both by 2025;
- restrictions on the input to all energy from waste facilities;
- encouraging local authorities and the resource management sector to establish good practice commitments and to work together to create consistent waste management services, benefitting businesses and the public;
- improved information on different waste sources, types and management highlighting further economic and environmental opportunities; and
- measuring the carbon impacts of waste to prioritise the recycling of resources which offer the greatest environmental and climate change outcomes.

Scotland's **National Planning Framework 3 (2014)** sets out the spatial strategy for Scotland over the next 20 to 30 years. It is a spatial expression of the Government Economic Strategy and of its plans for development and investment in infrastructure. This strategy is underpinned by the following aims:

- to create high quality, diverse and sustainable places that promote well-being and attract investment;
- to achieve at least an 80% reduction in greenhouse gas emissions by 2050;
- to respect, enhance and make responsible use of its natural and cultural assets;
- to maintain and develop good internal and global connections.

Water management and flooding is highlighted as a key issue that is thought to become increasingly important, as are changing water supplies and water quality issues as some of a number of issues that should be factored into planning decisions over the longer term. Moreover, Scotland's abundant water resources are valued for their contribution to quality of life; specifically, through the food and drink sector.

Demand for minerals is sought to support the construction and energy sectors and the Government's ambition for diversifying the energy mix. However, the need to actively address the past impacts of mineral extraction, through restoration and enhancement is highlighted.

The framework sets out 30 Actions to ensure that the delivery of priorities is co-ordinated with other strategies and targets for the Scottish Government and its agencies. As part of aspirations to deliver a 'low carbon place', the framework requires the Highland Council, and Dumfries and Galloway Council to continue to work with partners and communities to develop planning frameworks associated with the decommissioning of nuclear power stations at Dounreay and Chapelcross.

The **Scottish Planning Policy (2014)** sets out policies for (inter alia) the extraction of resources. It stipulates that the planning system should:

- safeguard workable resources and ensure that an adequate and steady supply is available to meet the needs of the construction, energy and other sectors;
- minimise the impacts of extraction on local communities, the environment and the built and natural heritage; and
- secure the sustainable restoration of sites to beneficial afteruse after working has ceased.

In recognition of Scotland's Zero Waste Plan (2010), the SPP (2014) states that the planning system should help deliver infrastructure at appropriate locations, prioritising development in line with the waste hierarchy.



## Waste and Resource Management

**Planning Advice Note: PAN 50 controlling the environmental effects of surface mineral workings (October 1996)** provides advice on the more significant environmental effects arising from mineral working operations.

The Scottish Government's **Online Planning and Waste Management Advice (July 2015)** complements the National Planning Framework 3 (2014), SPP (2014) and Scotland's Zero Waste Plan (2010). It replaced PAN 63 under Part 2 of the National Waste Management Plan for Scotland Regulations 2007.

## Wales

Part 1 of the **Environment (Wales) Act 2016** is concerned with the sustainable management of natural resources. It makes provisions for a new iterative process for the Welsh Ministers, Natural Resources Wales and other public bodies to contribute to achieving the sustainable management of natural resources. Part 1 of the Act also defines natural resources, sustainable management of natural resources and the principles of sustainable management of natural resources, and it confers functions on the Welsh Ministers and others to assist in the delivery of sustainable management of natural resources. Part 4 of the Act, meanwhile, is concerned with the collection and disposal of waste, and makes provision for requiring source segregation and separate collection of waste, banning the incineration of waste and banning the disposal of food waste to sewer from non-domestic premises. The purpose of the provisions is to promote increased separation of different types of waste and prohibit certain forms of disposal of recoverable types of waste.

**Planning Policy Wales (Edition 9): Chapter 12 Infrastructure and Services (2016)** deals with infrastructure and services; specifically issues of water supply and waste water management, waste management, energy supply from renewable and low carbon sources, and telecommunications. The overriding objective is for local planning authorities to "*maximise the use of existing infrastructure and should consider how the provision of different types of infrastructure can be co-ordinated*".

**Towards Zero Waste (2010)** is the overarching waste strategy document for Wales. It was published in 2010. The document sets out at a high-level strategy for the management of waste in Wales to produce benefits not only for the environment, but also for the economy and social wellbeing. Delivery actions have been developed in a series of sector plans, a **Waste Prevention Programme (2013)** and **Technical Advice Note (TAN) 21: Waste (2014)**, which provide advice on the role of land use planning in the management and control of waste. The Welsh Government has also created the **Natural Resource Management Programme** to take forward the policy commitments proposed in the **Sustaining a Living Wales Green Paper on a New Approach to Natural Resource Management in Wales (2012)**. This Programme includes:

- natural resource management policy, including the setting of national priorities;
- the Environment Bill;
- embedding the ecosystem approach, including associated demonstration projects which will showcase the benefits this approach can bring, and from which we can learn about how and when the approach can be used;
- working with Natural Resources Wales and coordinating performance management arrangements; and
- communications, engagement and knowledge sharing.

Those waste regulations that apply to England as identified above also apply to Wales, namely the **Waste (England and Wales) Regulations 2011** as amended by the **Waste (England and Wales) (Amendment) Regulations 2012** and the **Waste (England and Wales) (Amendment) Regulations 2014**.

## Waste and Resource Management

The **Hazardous Waste (Wales) Regulations 2005** set out the regime in Wales for the control and tracking of the movement of hazardous waste, as amended by The Hazardous Waste (Wales) (Amendment) Regulations 2009 and The Hazardous Waste (Miscellaneous Amendments) (Wales) Regulations 2015.

**Technical Advice Note (TAN) 12: Design (2014)** sets out the Welsh Government's land use planning policy in respect of promoting sustainability through good design. Achieving the efficient use and protection of natural resources is identified as an objective for good design. **Minerals Technical Advice Note (MTAN) Wales 1: Aggregates (March 2004)** sets out planning policy guidance in relation to aggregates extraction and related development in Wales is to provide aggregate resources in a sustainable way to meet society's needs in respect of aggregates related development.

### 11.3 Overview of the Baseline

#### UK

The UK Statistics on waste for December 2016<sup>309</sup> includes the following key points:

- The UK recycling rate for 'waste from households' was 44.3 per cent in 2015, falling from 44.9 per cent in 2014. This is the first time the rate has fallen since it began in 2010, though the 2015 figure still represents the second highest annual value on record. There is an EU target for the UK to recycle at least 50 per cent of household waste by 2020.
- UK Biodegradable Municipal Waste (BMW) sent to landfill has continued to reduce and in 2015 was 7.7 million tonnes. This represents 22 per cent of the 1995 baseline value. There is an EU target to restrict BMW landfilled to 35 per cent of the 1995 baseline by 2020. The UK comfortably met interim targets for 2010 and 2013.
- The recovery rate from non-hazardous construction and demolition waste in the UK in 2014 was 89.9 per cent. There is an EU target for the UK to recover at least 70 per cent of this type of waste by 2020.
- UK generation of commercial and industrial (C&I) waste was 27.7 million tonnes. This has fallen from 32.8 million tonnes in 2012.
- The UK generated 202.8 million tonnes of total waste in 2014. Over half of this (59.4 per cent) was generated by construction, demolition and excavation, with households responsible for a further 13.7 per cent.
- Of the 209.0 million tonnes of all waste that entered final treatment in the UK in 2014, 44.5% was recovered (including recycling and energy recovery). The proportion that went to landfill was 23.1 per cent.
- In 2014, 64.1 per cent of UK packaging waste was either recycled or recovered compared to 72.7 per cent in 2013. The 2014 EU target was for the UK to recycle or recover at least 60 per cent of packaging waste.

<sup>309</sup> Defra (2016) *UK Statistics on Waste*. Available online at:

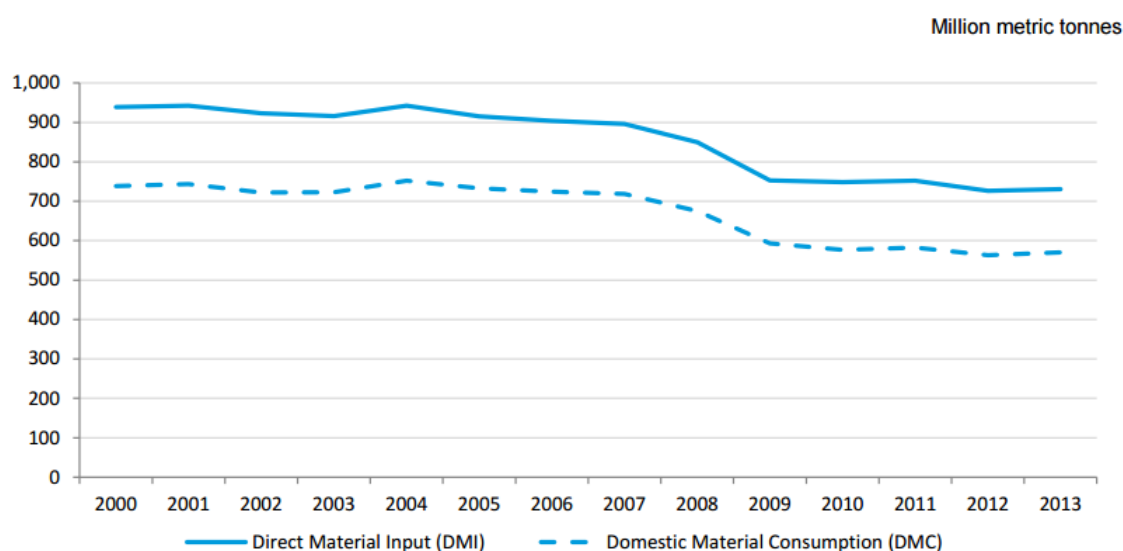
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/593040/UK\\_statsonwaste\\_statsnotice\\_Dec2016\\_FINALv2\\_2.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/593040/UK_statsonwaste_statsnotice_Dec2016_FINALv2_2.pdf)

## Waste and Resource Management

### Resource Use and Minerals

According to Defra Resource Statistics (2015)<sup>310</sup>, in 2013, the Domestic Material Consumption (DMC) was 570 million tonnes, and Direct Material Input (DMI) was 731 million tonnes – the lowest levels recorded on its records (See **Figure 11.1**)

Figure 11.1 UK Direct Material Input and Domestic Material Consumption, 2000 – 2012



**Notes:** Direct Material Input (DMI) (Domestic extraction + Imports) measures the total amount of materials available for use in the economy, Domestic Material Consumption (DMC) (Domestic extraction + Imports – Exports) measures the amount of materials used in the economy, and is calculated by subtracting exports from DMI.

**Source:** Defra: Digest of Waste and Resources Statistics – 2016 Edition.

**Table 11.1** summarises totals for extractors' sales of material for agricultural and industrial uses for 2013 for different mineral types<sup>311</sup>.

Table 11.1 Summary of totals for extractors' sales of material for agricultural, industrial and construction uses for 2013 for different mineral types

Mineral Type	UK Total Extractors' sales of material for agricultural and industrial uses for 2013 (Thousand tonnes)
Limestone, Dolomite and Chalk	69,640
Industrial Sand	3,948
Sand and Gravel	56,129
Sandstone	9,737

<sup>310</sup> Defra (2016) *Digest of Waste and Resource Statistics – 2016 Edition (revised)*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/567502/Digest\\_waste\\_resource\\_2016\\_rev4.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/567502/Digest_waste_resource_2016_rev4.pdf)

<sup>311</sup> DCLG (2016) *Mineral Extraction in Great Britain 2014*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/505631/Mineral\\_Extraction\\_in\\_Great\\_Britain\\_2014\\_final.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/505631/Mineral_Extraction_in_Great_Britain_2014_final.pdf)

## Waste and Resource Management

Mineral Type	UK Total Extractors' sales of material for agricultural and industrial uses for 2013 (Thousand tonnes)
Igneous Rock	338,283
Peat	795
Crushed Rock	98,423
Clay & Shale	6,806
Chalk*	3,312
Fireclay	129

\*NB only those parts of GB producing chalk are identified.

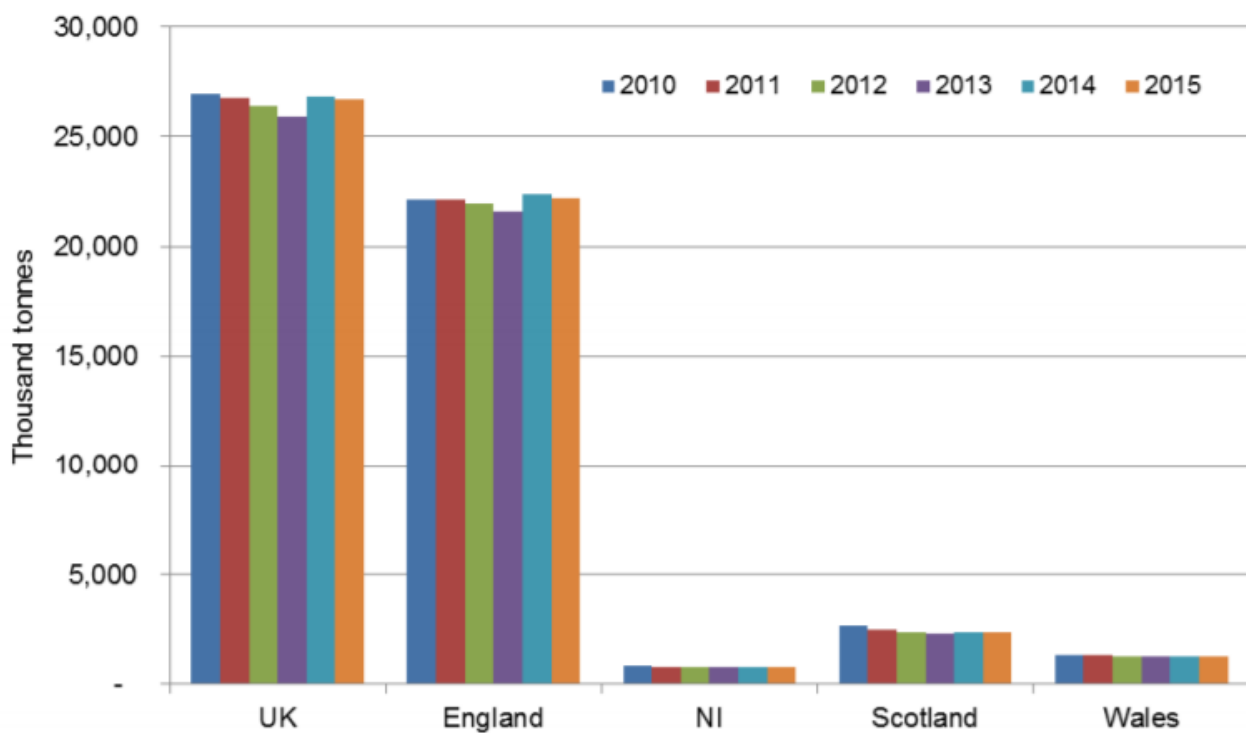
**Source:** DCLG: Mineral Extraction in Great Britain 2014, Business Monitor PA1007 (March 2016).

## England

### Waste

As can be seen in **Figure 11.2**, England is responsible for the majority of waste to landfill generated in the UK, with levels remaining relatively stable from 2010 – 2015

Figure 11.2 Quantity of waste from households 2010-2015



**Source:** Defra

## Waste and Resource Management

Commercial and industrial waste arising for the UK and England are shown in **Table 11.2**. The term 'commercial and industrial' spans a range of economic activities (based on the European NACE statistical classification of economic activities in the European Community) including manufacturing, industrial processes and service based enterprises. The UK Commercial and Industrial sectors generated 27.7 million tonnes of waste in 2014, of which 19.8 million tonnes was in England.

Table 11.2 Total waste generation from the commercial and industrial sectors 2010-2014

<i>million tonnes</i>						
	UK			England		
	Commercial	Industrial	Total C&I	Commercial	Industrial	Total C&I
<b>2010</b>	20.0	13.9	33.9	13.1	9.5	22.6
<b>2011</b>	UK 2011 Estimates not available			England 2011 Estimates not available		
<b>2012</b>	16.9	15.9	32.8	12.9	11.3	24.2
<b>2013</b>	UK 2013 Estimates not available			11.6	10.4	21.9
<b>2014</b>	15.1	12.6	27.7	11.1	8.7	19.8

Source: Defra statistics

The household recycling rate in England in 2015 was 43.9%, an increase of 2.7% since 2010 but below the UK rate of 44.3%<sup>312</sup>.

## Scotland

### Waste

As shown in **Figure 11.3**, between 2004 and 2007 the amount of household waste generated in Scotland increased from 2.77 million tonnes to 3.00 million tonnes, before falling back to 2.77 million tonnes in 2010. Between 2011 and 2015, the total amount of household waste generated fell by 5.3% (0.14 million tonnes)<sup>313</sup>.

<sup>312</sup> Defra (2016) *UK Statistics on Waste*. Available online at:

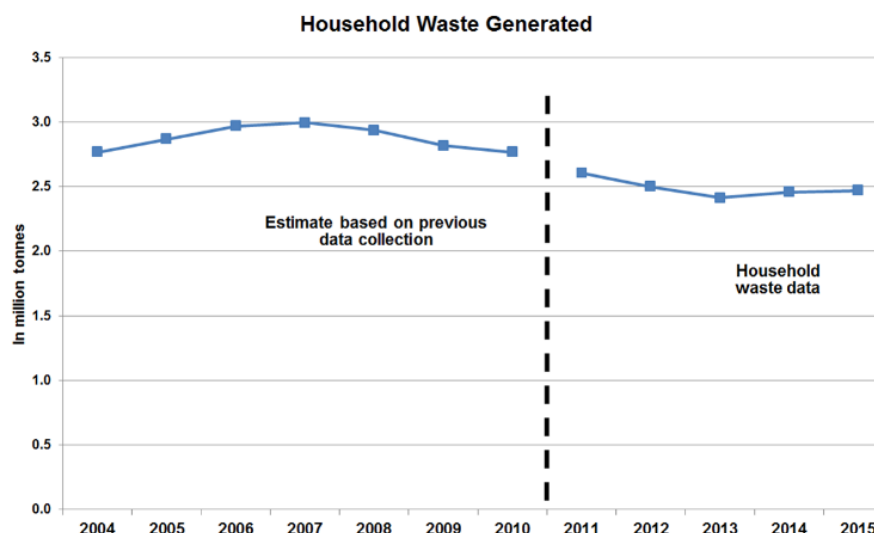
[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/593040/UK\\_statsonwaste\\_statsnotice\\_Dec2016\\_FINALv2\\_2.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/593040/UK_statsonwaste_statsnotice_Dec2016_FINALv2_2.pdf)

<sup>313</sup> Scottish Government (2016) *Household Waste Generated - High Level Summary of Statistics Trend*. Available online at:

<http://www.gov.scot/Topics/Statistics/Browse/Environment/TrendHouseholdWaste>

## Waste and Resource Management

Figure 11.3 Household Waste Generation in Scotland (2004-2015)



**Source:** Scottish Government (2016). Household Waste Generated - High Level Summary of Statistics Trend.

Between 2005 and 2014, the amount of Scottish waste sent to landfill decreased by 42%. Over the same period, the amount of biodegradable municipal waste landfilled in Scotland decreased by 51%. The household waste recycling rate in 2015 was 44.2%, increasing from 42.8% in 2014. There has also been a decline in households throwing food out with general waste, from 73% in 2012 to 55% in 2015. The proportion of households reporting that they recycled a range of other waste items increased each year between 2003 and 2011, however between 2011 and 2015 there was little change in the percentage of households recycling each item, except for plastic bottles which increased by 7 percentage points to 82%<sup>314</sup>.

## Wales

### Waste

**Table 11.3** shows waste arisings by management method as reported by the Welsh Government.

Table 11.3 Waste arisings by sector

	1998-99	2002-03	2007-08
Landfill	4,765	3,647	3,089
Recycled	4,524	6,671	13,476
Other recovery	1,329	2,353	101
Other disposal	306	156	357
Energy recovery	37	24	27

<sup>314</sup> Scottish Government (2016) Key Scottish Environment Statistics 2016. Available online at: <http://www.gov.scot/Resource/0050/00508344.pdf>

## Waste and Resource Management

In 2015-16 total municipal waste produced in Wales amounted to approximately 1.59 million tonnes, of which approximately 289,000 tonnes of waste were sent to landfill. The percentage of waste which was reused, recycled or composted stood at 60.2%, up from 56.2% in 2014-15<sup>315</sup>.

### 11.4 Summary of Existing Problems Relevant to the Water Resources NPS

The following existing problems for waste and resource use have been identified:

- The total amount of waste produced each year is likely to decrease in coming years.
- The consumption of non-renewable sources will deplete overall stocks and result in a scarcity of resources for future generations.
- Large scale water resources infrastructure may require both short-term (i.e. during construction) and long-term (i.e. during operation) use of materials that are non-renewable or are imported. In doing so, schemes may have an environmental impact that extends outside the water company operational area.

### 11.5 Likely Evolution of the Baseline

#### UK

The majority of UK trend data shows an ongoing improvement in UK waste management practices, both in terms of a reduction in the level of waste generation and a greater use of sustainable alternatives to landfill. The UK recycling rate for 'waste from households' was 44.3 per cent in 2015, falling from 44.9 per cent in 2014. This is the first time the rate has fallen since it began in 2010, though the 2015 figure still represents the second highest annual value on record, suggesting that household recycling rates may have plateaued<sup>316</sup>.

#### England

Defra has established targets for England which includes a greater focus on waste prevention, seeking to achieve a fall of 50% per person in household waste arising. Recycling and composting of household waste targets have been established - at least 50% by 2020; and recovery of municipal waste - 75% by 2020.

On the basis of an evaluation of the development of waste streams in the future set out in the Waste Management Plan for England<sup>317</sup> commercial and industrial waste arisings are predicted to fall to 43.9 million tonnes by 2020.

<sup>315</sup> Welsh Government (2016) *Waste managed (tonnes) by management method and year*. Available online at: <https://stats.wales.gov.uk/Catalogue/Environment-and-Countryside/Waste-Management/Local-Authority-Municipal-Waste/Annual/wastemanaged-by-management-year>

<sup>316</sup> Defra (2016) *UK Statistics on Waste*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/593040/UK\\_statsonwaste\\_statsnotice\\_Dec2016\\_FINALv2\\_2.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/593040/UK_statsonwaste_statsnotice_Dec2016_FINALv2_2.pdf)

<sup>317</sup> Defra (2013) *Waste Management Plan for England*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/265810/pb14100-waste-management-plan-20131213.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/265810/pb14100-waste-management-plan-20131213.pdf)

## Waste and Resource Management

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### Scotland

Under the 'Zero Waste Plan', the Scottish Government has set a long-term target of 70% recycling/ composting and preparing for reuse of all waste arising in Scotland by 2025, regardless of its source. The Scottish Government has also set a target of no more than 5% of all waste produced to go to landfill by 2025<sup>318</sup>.

### Wales

With regard to commercial wastes, Towards Zero Waste - One Wales: One Planet<sup>319</sup> seeks to increase recycling from 57% in the period 2015/16 and to 70% in 2024/25. For industrial wastes, recycling is targeted to increase from 63% in the period 2015/16 to 70% in 2024/25.

## 11.6 Assessing Significance

The objectives and guide questions related to waste and resource use which have been identified for use in the appraisal of the effects of Water Resources NPS proposals are set out in **Table 11.4**, together with reasons for their selection.

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<sup>318</sup> Scottish Environment Protection Agency (2010) *Scotland's Zero Waste Plan Data*. Available online at: [http://www.sepa.org.uk/waste/waste\\_data/zero\\_waste\\_plan\\_data.aspx](http://www.sepa.org.uk/waste/waste_data/zero_waste_plan_data.aspx)

<sup>319</sup> Welsh Assembly Government (2010) *Towards Zero Waste - One Wales: One Planet*. Available online at: <http://gov.wales/docs/desh/publications/100621wastetowardszeroen.pdf>



## Waste and Resource Management

Table 11.4 Approach to Assessing the Effects of the Water Resources NPS on Waste and Resource Use

Objective/guide question	Reasoning
<b>Objective: To minimise waste arisings, promote reuse, recovery and recycling, minimise the impact of wastes on the environment and communities and contribute to the sustainable use of natural and material assets.</b>	<p>The SEA Directive (2001/42/EC) requires likely significant effects on material assets (including resources) be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.</p> <p>Large scale infrastructure projects have the potential to generate very high volumes of waste during both construction and operation. This waste should be managed in accordance with the waste hierarchy. The inclusion of this AoS objective ensures that these effects can be considered within the AoS.</p>
Will the Water Resources NPS maximise re-use and recycling of recovered components and materials?	<p>Recovering and recycling waste will assist in decreasing the amount of waste to landfill. The Landfill Directive (1999/31/EC) aims to reduce amount of biodegradable waste going to landfill to 35% of the 1995 figures by 2020.</p> <p>The Waste Management Plan for England also includes targets for recycling rates.</p>
Will the Water Resources NPS help achieve government and national targets for minimising, recovering and recycling waste?	<p>Minimising, recovering and recycling waste will assist in decreasing the amount of waste to landfill. The Landfill Directive (1999/31/EC) aims to reduce amount of biodegradable waste going to landfill to 35% of the 1995 figures by 2020.</p> <p>This is supported through the Waste Management Plan for England.</p>
Will the Water Resources NPS increase the burden on limited natural resources?	<p>Conservation of resources and living within environmental limits are underlying objectives of several the international policies such as European Spatial Development Perspective, and national policy, such as Framework for Sustainable Development.</p> <p>The National Planning Policy Framework and Planning Practice Guidance seeks to facilitate the sustainable use of minerals.</p>
Will the Water Resources NPS make best use of existing infrastructure and resources?	Use of existing infrastructure and resources will decrease the total resources required and will increase efficiency.

**Table 11.5** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the resource use and waste objectives.

Table 11.5 Illustrative Guidance for the Assessment of Significance for Waste and Resource Use

Effect	Description	Illustrative Guidance
++	Significant Positive	<ul style="list-style-type: none"> <li>Option would increase the capacity of waste management infrastructure;</li> <li>Option would create no additional hazardous or non-recyclable waste, whilst maximising the proportion of materials that are re-useable or recyclable;</li> <li>Option would ensure the safe handling of hazardous wastes;</li> <li>Option would make best use of existing infrastructure and resources (e.g. buildings and other facilities on sites) and help conserve natural resources.</li> </ul>
+	Positive	<ul style="list-style-type: none"> <li>Option would not create an increase in the volume of hazardous and non-recyclable wastes that require disposal;</li> <li>Option would increase the volume of materials reused and recycled;</li> <li>Option would make best use of existing infrastructure and resources (e.g. buildings and other facilities on sites).</li> </ul>
	Neutral	<ul style="list-style-type: none"> <li>Option would not create an increase in the volume of hazardous and non-recyclable wastes that require disposal;</li> </ul>

## Waste and Resource Management

Effect	Description	Illustrative Guidance
0		<ul style="list-style-type: none"> <li>Option would have no effect on the capacity of waste management infrastructure;</li> <li>Option would not have any impact on existing natural resources.</li> </ul>
-	Negative	<ul style="list-style-type: none"> <li>Option would increase volumes of hazardous and non-recyclable waste that would require disposal;</li> <li>Option would have a limited adverse impact on the capacity of existing waste management systems;</li> <li>Option would require the limited use of natural resources during construction and operational stages.</li> </ul>
--	Significant Negative	<ul style="list-style-type: none"> <li>Option would generate a high volume of hazardous and non-recyclable waste that would require disposal;</li> <li>Option would impede the achievement of government and national targets for minimising, recovering and recycling waste;</li> <li>Option would have a significant adverse impact on the capacity of existing waste management systems (e.g. leading to the permitting of additional landfill capacity to accommodate waste);</li> <li>Option would increase risks associated with the handling of hazardous wastes;</li> <li>Option would require a significant volume of natural resources and result in the direct loss of resources.</li> </ul>
?	Uncertain	<ul style="list-style-type: none"> <li>From the level of information available, the effect that the option would have on this objective is uncertain.</li> </ul>

## Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 11.6** presents the appraisal of the likely significant effects of the draft NPS and the 'no NPS' alternative on the waste and resources objective. The appraisal considers in-turn the three sub-sections used for each topic within Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making and Mitigation. The performance of the draft NPS and the 'no NPS' alternative are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters 1 – 3 of the draft NPS outlining how the remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the 'no NPS' alternative is then summarised along with any proposed mitigation measures.

## Waste and Resource Management

Table 11.6 Appraisal of the Draft NPS and Reasonable Alternatives: Waste and Resources

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	+	+/?	<p><b>Draft NPS:</b> The draft NPS under the heading of 'Applicant's Assessment' states:</p> <p>4.12.6 "The applicant should set out the arrangements that are proposed for managing any waste produced in the application for development consent. The applicant should prepare a Site Waste Management Plan. The arrangements in the plan should include information on the proposed waste recovery and disposal system for all waste generated by the development and should also include details of the alternatives that have been considered. The applicant must demonstrate that all waste produced by the facility will be managed in accordance with the waste hierarchy... and that, during construction, excavated soil, subsoil and rock will, where possible, be reused. The applicant must also set out the process in place to ensure their duty of care as a waste producer...is met. The applicant should seek to minimise the volume of waste produced. The applicant should also seek to minimise the volume of waste sent for disposal unless it can be demonstrated that this is the best overall environmental, social and economic outcome when considered over the whole lifetime of the project."</p> <p>The requirement for applicants to identify the arrangements for the management of waste in accordance with the waste hierarchy and for the preparation of a site waste management plan (SWMP) will help to ensure that waste arisings associated with the construction and operation of water resources infrastructure are minimised and that reuse, recycling and recovery are promoted. It is also noted that reference is made to 'the best overall environmental, social and economic outcome' which implies a requirement for applicants to consider the wider sustainability impacts of waste management.</p> <p>Overall, this has been assessed as having a positive effect on this AoS objective.</p> <p><u>Recommendations for improvement</u></p> <p>Whilst the reuse of waste including excavated soil, subsoil and rock will help to minimise resource use associated with new water resources infrastructure, there are currently no specific requirements with regards to minimising resource use. Consideration should therefore be given to including criteria requiring that evidence be provided by applicants showing that steps have been taken to minimise resource use and promote the use of locally-sourced, sustainable materials where possible. This not only includes minimising the use of resources in construction, but also includes energy and heat management in infrastructure and minimising water and chemical use. However, and reflecting that it is a cross cutting theme, a number of other topics in Section 4 and the criteria for 'good design' detailed in Section 3 of the draft NPS do help to address this issue. This is considered further below (see 'Other Sections of the draft NPS').</p>

## Waste and Resource Management

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>This section could make a specific recommendation that applicants take account of locally adopted waste plans and strategies. Reference could also be made to the need to minimise the transportation of waste. In this context, it would be useful for the text to make direct reference to National Planning Policy for Waste (2014) and in particular to paragraph 8 which concerns non-waste development. In this context, consideration could be given to the provision of additional guidance requiring that decisions regarding siting and assessments consider:</p> <ul style="list-style-type: none"> <li>the likely impact of proposed, non-waste related development on existing waste management facilities (including their capacity to receive and treat/dispose of waste generated by water resources infrastructure construction and operation), and on sites and areas allocated for waste management;</li> <li>the requirement for the provision of waste management facilities and their integration with the rest of the development; and</li> <li>the handling of waste arising from the construction and operation of water resources infrastructure to maximise reuse/recovery opportunities, and minimise off-site disposal.</li> </ul> <p>There is no detailed guidance on the potential contents that should form part of the Environmental Statement (ES). Specification of the contents of the ES could be drawn from the following, which reflects the Planning Practice Guidance (PPG) on waste requirement for waste audits and EIA Regulations:</p> <ul style="list-style-type: none"> <li>Scoping <ul style="list-style-type: none"> <li>Identify and evaluate any potentially significant sources and types of waste and resource use for both the construction (including any excavation and/or demolition wastes) and operational phases of development.</li> <li>Identify and describe the waste treatment and disposal facilities expected to receive the wastes identified above.</li> <li>Describe any future anticipated changes to the baseline in the absence of the proposed infrastructure, to inform the assessment of impacts.</li> <li>Provide the methodological basis for determining the significance of effects and the scope of effects to be assessed.</li> </ul> </li> <li>Impact Assessment <ul style="list-style-type: none"> <li>Assess the anticipated type and volumes of waste that the development could generate and the consequent increase in demand for waste treatment and disposal facilities.</li> </ul> </li> </ul>

## Waste and Resource Management

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>○ Identify the steps to be taken to ensure effective segregation of wastes at source including, as appropriate, the provision of waste sorting, storage, recovery and recycling facilities.</li> <li>○ Identify the steps to be taken to ensure the maximum amount of waste arising from development on previously developed land is incorporated within the new development, where applicable.</li> <li>○ Identify the nature and quantity of materials and natural resources required during the construction and operational phases of development.</li> <li>• Avoidance, mitigation, compensation and enhancement <ul style="list-style-type: none"> <li>○ Identify and incorporate measures to avoid, reduce and compensate for waste impacts, and where possible enhance beneficial effects.</li> <li>○ Identify and incorporate measures to minimise the use of resources/promote the use of sustainable materials.</li> <li>○ Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.</li> </ul> </li> </ul> <p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and the EIA Regulations as well as a wide range of legislation at the European and national level on waste including the Waste Framework Directive. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on waste and resource use. The environmental permitting regime also incorporates operational waste management requirements for certain activities.</p> <p>This policy and legislative framework are expected to help ensure that applicants consider the impacts of new water resources infrastructure on waste and resources, generating a positive effect on this objective. However, the absence of a clear statement regarding waste considerations and impacts on resource use (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level.</p> <p>Overall, this reasonable alternative is considered to have a positive effect on waste and resources, although some uncertainty remains.</p>
<b>Decision Making</b>			<b>Draft NPS:</b> The draft NPS states:

## Waste and Resource Management

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>4.12.7 "The Secretary of State will consider the extent to which the applicant has proposed an effective process that will be followed to ensure effective management of hazardous and non-hazardous waste arising from all stages of the lifetime of the development. The Secretary of State should be satisfied that the process set out provides assurance that:</p> <ul style="list-style-type: none"> <li>Waste produced will be properly managed, both onsite and offsite;</li> <li>The waste from the proposed development can be dealt with appropriately by the waste infrastructure which is, or is likely to be, available. Such waste arisings should not have an adverse effect on the capacity of existing waste management facilities to deal with other waste arising in the area; and</li> <li>Adequate steps have been taken to minimise the volume of waste arising, and of the volume of waste arising sent to disposal, except where an alternative is the most sustainable outcome overall."</li> </ul> <p>It is considered that the draft NPS provides a clear decision-making framework in relation to the consideration of waste. This is expected to help ensure that waste arisings associated with the construction and operation of new water resources infrastructure will be minimised and that reuse, recycling and recovery will be promoted. In consequence, the draft NPS has been assessed as having a positive effect on waste and resources.</p> <p><u>Recommendations for improvement</u></p> <p>It is considered that the guidance could be more definitive in respect of the circumstances in which the Secretary of State could refuse consent on the grounds of the management of waste which could include, for example, concerns raised by the Environment Agency that remain unresolved. Clearer direction could also be provided with respect to the need for the Secretary of State to consider the impact of waste management activities on the environment and communities.</p> <p>It is considered that the guidance could seek to ensure that the Secretary of State is satisfied that a suitable approach to minimising resource use during construction and operation has been undertaken.</p>
	+	+/?	<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and the EIA Regulations as well as a wide range of legislation at the European and national level on waste including the Waste Framework Directive. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on waste and resource use. The environmental permitting regime also incorporates operational waste management requirements for certain activities.</p> <p>This policy and legislative framework is expected to help ensure that decisions made by the Secretary of State take account of the impacts of new water resources infrastructure on waste and resources, generating a positive effect on this objective.</p>

## Waste and Resource Management

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>However, the absence of a clear statement regarding waste considerations and impacts on resource use to be taken into account by the Secretary of State (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level.</p> <p>Overall, this reasonable alternative is considered to have a positive effect on waste and resources, although some uncertainty remains.</p>
Mitigation	+	+/?	<p><b>Draft NPS:</b> The draft NPS sets out that, where necessary, the Secretary of State should use requirements or obligations to ensure that appropriate measures for waste management are applied. It also states that the applicant should identify a suite of mitigation measures to eliminate or significantly reduce the risk of adverse impacts associated with resource use and waste management. More specific mitigation measures are provided in the 'Introduction' section. Overall, this would be expected to have a positive effect on this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>To inform the appraisal of this section of the draft NPS, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on waste and resources has been undertaken. This review is intended to help identify where any additional measures could be included in the draft NPS (in the introduction or mitigation section of the topic) to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p> <p><i>Construction</i></p> <p>As identified in the draft NPS, the construction of new or enlarged reservoirs will involve high levels of resource use including raw materials and energy. Construction activity would also generate waste arisings including, in particular, excavated soil.</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, reservoir operation is not expected to have a significant impact on waste and resources; however, there may be waste arisings and resource use (such as chemicals) associated with the operation of associated infrastructure such as water treatment works.</p> <p><b>Water Transfer Schemes</b></p> <p><i>Construction</i></p>

## Waste and Resource Management

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>As identified in the draft NPS, the construction of water transfer schemes and any associated development will likely involve high levels of resource use including raw materials and energy. Construction activity would also generate waste arisings including, in particular, excavated soil (although it is anticipated that any soil displaced during pipeline works would be reinstated).</p> <p><i>Operation</i></p> <p>As per the operational impacts for reservoirs.</p> <p><b>Desalination</b></p> <p><i>Construction</i></p> <p>As identified in the draft NPS, the construction of desalination plants will likely involve high levels of resource use including raw materials and energy. Construction activity would also generate waste arisings including, in particular excavated soil.</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, desalination plants will generally use brackish or sea water as a primary resource. As a by-product of the desalination process, brine effluent is produced and will be discharged into a watercourse or the sea which needs to be managed so that it does not have a harmful environmental impact.</p> <p>The operation of desalination plants will likely require high volume of energy and chemical use. There are also likely to be associated waste arisings requiring disposal which may be contaminated (e.g. sludge).</p> <p><b>Potential additional mitigation measures identified through a review draft WRMPs and their associated SEA Environmental Reports include:</b></p> <ul style="list-style-type: none"> <li>• Energy efficient plant and construction methods should be adopted to reduce energy usage during construction.</li> <li>• Managing heat, energy and water use in buildings to minimise use and consequent waste.</li> </ul> <p><b>No NPS:</b> Under this alternative, appropriate mitigation measures will be considered by the competent authority in light of the proposals submitted. As such, mitigation measures will be applied but there is the risk that this is open to interpretation and thereby does not fully address an appropriate range of activities which are directly related to a proposed scheme.</p> <p>Overall, this reasonable alternative is considered to have a positive effect on waste, although some uncertainty remains.</p>



## Waste and Resource Management

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Other Sections of the Draft NPS Relevant to Waste and Resources</b>	<p>The following provides additional commentary on the text in the other sections of the draft NPS relevant to waste and resources. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b><u>1. Introduction</u></b></p> <p><b>1.1. Background and scope of this NPS</b> – reference to the AoS prepared in support of the draft NPS will help to ensure that the effects on waste and resources are given proper consideration, notwithstanding the fact that there remains uncertainty over potential impacts, particularly in respect of the absence of specific locations and likely effects within the draft NPS.</p> <p>With regard to para 1.1.8, there is an opportunity for the consideration of effects on waste and resource use in a specific locality through the preparation of a local impact report submitted by a local authority in accordance with the Planning Act 2008. There is no prescribed format for local impact reports but there is clearly an opportunity for a local authority to comment on relevant issues, helping to ensure that consideration is given to likely effects in a particular locality.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on waste and resources in Scotland and Wales.</p> <p><b>1.3. Infrastructure covered by the Water Resources NPS</b> – as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on waste and resources.</p> <p><b><u>2. Government policy and the need for water resources infrastructure</u></b></p> <p><b>2.5. The role of water resource management plans in identifying the need</b> – as noted, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on waste and resources. This is reflected in paragraph 2.5.7.</p> <p><b>2.6 The role of nationally significant infrastructure projects</b> – the section identifies that alongside reservoirs, water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP, when assessed against the relevant threshold in the Planning Act 2008 or through a section 35 referral. These infrastructure types may have waste impacts of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p> <p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p><b><u>3. Assessment Principles</u></b></p> <p><b>3.1 General principles of assessment</b> – the provisions of the Planning Act 2008 and the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, provides the starting point for the assessment of waste and resources.</p>		

## Waste and Resource Management

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on waste and resources.</p> <p><b>3.2 Environmental Impact Assessment</b> – the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that effects on waste and resources are fully considered, as will the consideration of cumulative effects and interrelationships between effects.</p> <p>This section specifically highlights that information gathered from the WRMP options assessments and the draft NPS will also be useful to identify the significant effects of a proposed project.</p> <p><b>3.4 Environmental Net Gain</b> - consideration of opportunities for environmental net gain during the WRMP options appraisal process and in the detailed design of schemes will ensure the protection and (where possible) enhancement of natural resources. It is noted that this section advises that water companies consider using natural capital accounting and ecosystem services assessments to inform planning and underpin environmental improvements and that <i>"Applications for development consent must be accompanied by a statement demonstrating how opportunities for environmental net gain have been incorporated into the detailed design (including any relevant operational aspects) of the project"</i>.</p> <p><b>3.5 Assessing Alternatives</b> – the requirement that reasonable alternatives will need to be considered as part of scheme design and project planning, including as part of the WRMP options appraisal process, should ensure that waste and resource use are taken into account.</p> <p><b>3.6 Criteria for 'good design' for water resources infrastructure</b> – the construction and operation of new water resources infrastructure will require large quantities of materials. Reflecting the requirements of the EIA Directive (as amended), this section stipulates that applicants should be expected to set out the nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) required.</p> <p><b>3.8 Environmental regulation</b> - The draft NPS sets out that the Examining Authority may wish to consult the regulator on any management plans that would be included in an environmental permit application and encourage early pre-application discussions between the applicant and the relevant regulator. This is expected to help ensure that waste and resource use issues are fully taken into account.</p>		
<b>Summary Appraisal of Likely Significant Effects</b>	+	+/?	<p><b>Draft NPS:</b> The construction of nationally significant water resources infrastructure will likely require substantial volumes of resources as well as natural resources such as water. During the lifetime of such a project, and particularly at construction, large quantities of waste will also be generated. In this context, the draft NPS promotes good design as an integral consideration from the outset of a proposal which, allied with the application of the environmental net gain principle, is expected to help encourage the sustainable use of natural resources and material assets, including through the re-use and recycling of wastes and materials. It is also considered that the draft NPS provides a clear framework for applicants and the Secretary of State in relation to the consideration of waste that will help to ensure that waste arisings associated with the</p>

## Waste and Resource Management

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>construction and operation of new water resources infrastructure are minimised and that reuse, recycling and recovery are promoted.</p> <p>Overall, the draft NPS has been assessed as having a positive effect on this AoS objective.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and the EIA Regulations as well as a wide range of legislation at the European and national level on waste including the Waste Framework Directive. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on waste and resources. The environmental permitting regime also incorporates operational waste management requirements for certain activities. This policy and legislative framework is expected to help ensure that applicants and the Secretary of State consider the impacts of new water resources infrastructure on waste and resources, generating a positive effect on this objective. However, the absence of a clear statement regarding waste considerations and impacts on resource use (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level.</p> <p>Overall, this reasonable alternative is considered to have a positive effect on waste and resources, although some uncertainty remains.</p>
<b>Summary of Recommended Mitigation and Enhancement</b>	<p>The draft NPS makes a positive contribution to the AoS objective for waste and resources. It is considered that section 4.12 of the draft NPS could be enhanced through, in particular:</p> <ul style="list-style-type: none"> <li>the provision of guidance with respect to the assessment of waste and resources as part of any ES (as required);</li> <li>more definitive guidance in respect of the circumstance(s) in which the Secretary of State could refuse consent on the grounds of the management of waste;</li> <li>the provision of further guidance in respect of resource use for applicants and the Secretary of State;</li> <li>the inclusion of a recommendation that applicants take account of locally adopted waste plans and strategies and engage early with the relevant waste collection and disposal authorities, operators and the Environment Agency;</li> <li>the inclusion of a reference to the need to minimise the transportation of waste;</li> <li>the provision of a direct reference to National Planning Policy for Waste (2014) and the PPG.</li> </ul> <p>Additional project-level mitigation for inclusion in the draft NPS is suggested based on a review of draft WRMPs and their associated SEA Environmental Reports. This includes:</p> <ul style="list-style-type: none"> <li>Energy efficient plant and construction methods should be adopted to reduce energy usage during construction.</li> <li>Managing heat, energy and water use in buildings to minimise use and consequent waste.</li> </ul>		

## Traffic and Transport

# 12. Traffic and Transport

## 12.1 Introduction

This section presents the overview of plans, programmes and baseline information for the appraisal of sustainability of the Water Resources National Policy Statement in respect of traffic and transport. Within this context, the definitions of traffic and transport are provided below:

- Traffic - the aggregation of pedestrians or vehicles coming to or leaving from a particular locality during a defined period of time.
- Transport - the movement of people and goods from one place to another. Transport is performed by various modes, such as air, rail, road and water.

There are links between the traffic and transport topic and other topics in the Appraisal of Sustainability (AoS) including air quality, noise, health, biodiversity, landscape, climatic factors and population, economics and skills.

## 12.2 Review of Plans and Programmes

The focus of plans and programmes on transport is on both maintaining a free-flowing transport system, particularly with respect to roads, and on promoting sustainable modes of transport. Inland waterways are seen as an underutilised resource with the potential to be further utilised for freight movement and potentially bulk water transfers.

### International/European

**Directive 2008/68/EC** on the inland transport of dangerous goods, establishes a common regime for all aspects of the inland transport of dangerous goods, by road, rail and inland waterways within the EU.

The European Commission's White Paper entitled **Roadmap to a Single European Transport Area (2011)** sets out a vision for the future of European transport up to 2050. The key goals include reducing the use of petrol and diesel cars in cities by half by 2030, phasing them out completely by 2050 to achieve CO<sub>2</sub>-free city mobility by 2030; increasing the use of low-carbon sustainable fuels in air transport to 40 % by 2050; and achieving a 50% modal shift in medium distance intercity passenger and freight journeys from road to rail and waterborne transport. All of these goals seek to contribute to an overall target of reducing transport emissions by 60% by 2050.

### UK

The **Transport Act 2000** aimed to give effect to the UK Government's strategy for an integrated transport policy set out in the White Paper entitled **A New Deal for Transport: Better for Everyone (1998)**<sup>320</sup>. The Act introduced a number of reforms to local transport planning and delivery, including the requirement for all local transport authorities in England, outside of London, to produce a local transport plan. It also granted

<sup>320</sup> Department for Transport (1998) *A new deal for transport: better for everyone - white paper*. Available online at: <http://webarchive.nationalarchives.gov.uk/+/http://www.dft.gov.uk/about/strategy/whitepapers/previous/anewdealfortransportbetterfo5695>

## Traffic and Transport

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new powers for local authorities to enter into quality partnerships with bus operators and to introduce road user charging schemes and workplace parking levies.

The **Local Transport Act 2008** empowers local authorities to take appropriate steps to meet local transport needs in the light of local circumstances.

### England

**Cutting Carbon, Creating Growth: Making Sustainable Local Transport Happen White Paper (Department for Transport (DfT), (2011))** sets out a vision for a transport system that is an engine for economic growth and also greener and safer and improves quality of life in communities. The White Paper sets out the Government's priority for local transport which is to encourage sustainable local travel and economic growth by making public transport and cycling and walking more attractive and effective, promoting lower carbon transport and tackling local road congestion.

The **National Planning Policy Framework (MHCLG, 2018)** aims to integrate planning and transport to promote more sustainable transport choices, enhance accessibility to jobs, shopping, leisure facilities and services by public transport, walking and cycling and to reduce the need to travel, especially by car.

The **National Networks National Policy Statement (DfT, 2014)** sets out the: need for development of road, rail and strategic rail freight interchange projects on the national networks; and the policy against which decisions on major road and rail projects will be made. The **National Policy Statement for Ports (DfT, 2012)** provides the framework for decisions on proposals for new port development.

### Scotland

First published in 2006 and refreshed in January 2016, **Scotland's National Transport Strategy (2006)** aims to connect people to jobs, education, services and recreation. The refreshed strategy reaffirms the continued validity of the three key strategic outcomes identified in the original strategy, namely:

- improve journey times and connections between cities and towns and global markets to tackle congestion and provide access to key markets;
- reduce emissions to tackle climate change; and
- improve quality, accessibility and affordability of transport, to give people the choice of transport and alternatives to the car.

The **Scottish Planning Policy (2014)** seeks to promote sustainable transport and active travel and states that the planning system should support patterns of development which optimise the use of existing infrastructure, reduce the need to travel, provide safe and convenient opportunities for walking and cycling for both active travel and recreation, enable the integration of transport modes and facilitate freight movement by rail or water.

One of the visions of **Scotland's Third National Planning Framework (NPF3) (2014)** is that of a connected place and where the whole country has access to high-speed fixed and mobile digital networks. It sets out that better use of the existing infrastructure should be made, and that there should be improved digital and international transport links to facilitate growth and an inclusive society. The long-term development strategy provided by NPF3 complements other strategic documents and is important in delivering the Scottish Government's aspiration for sustainable economic growth. In this context, the NPF identifies the following spatial priorities for change:

- cities will be better connected and provide a gateway to the rest of the world;

## Traffic and Transport

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- rural areas will be more accessible; and
- we will reduce the disadvantage of distance for our coastal and island communities.

**Planning Advice Note: PAN 75 – Planning for Transport (2005)** aims to create greater awareness of how linkages between planning and transport can be managed. It highlights the roles of different bodies and professions in the process and points to other sources of information.

### Wales

**One Wales: Connecting the Nation (2008)** is the Welsh strategy for transport. It contains 17 long-term social, economic and environment outcomes for transport in Wales, and these are set out under five key themes which include:

- reducing greenhouse gas emissions and other environmental impacts;
- improving public transport and better integration between modes;
- improving links and access between key settlements and sites across Wales and strategically important all-Wales links;
- enhancing international connectivity; and
- increasing safety and security.

The **National Transport Plan (2010)** sets out ten proposals to provide people with a range of transport options, including to continue to establish sustainable travel centres across Wales, increasing healthy and sustainable travel choices and improving local bus services. The **National Transport Finance Plan 2015** identifies the financing and delivery timetables for transport schemes undertaken by the Welsh government. This includes maintenance and safety schemes alongside new infrastructure

**Planning Policy Wales (Edition 9) (2016)** identifies several objectives including promoting sustainable transport for freight and commerce, supporting sustainable transport options in rural areas, supporting necessary infrastructure improvements and ensuring that, as far as possible, transport infrastructure does not contribute to land take, urban sprawl or neighbourhood severance.

**Technical Advice Note (TAN 18) on Transport and the Transport Strategy for Wales (2008)** sets out key planning policy objectives for transport. These include promoting resource and travel efficient settlement patterns, ensuring new development is located where there is or will be good access by public transport, walking and cycling and managing parking provision.

## 12.3 Overview of the Baseline

### UK

The following sub-sections review the current situation on the UK's transport networks.

## Traffic and Transport

### Road

The roads and streets of the UK are an important resource for commuting, private journeys and the transportation of freight. The UK has a road infrastructure network of 396 thousand kilometres, the majority of which is made up of minor roads (87.3%)<sup>321</sup>.

Between 195 and 2015, the distance travelled by motor vehicles increased by 18.6%. In 2015, a total of 509.7 billion kilometres were travelled by all motor vehicles in the UK, an increase of 11.8 billion miles since 2013. In Great Britain, overall there has been a steady increase in domestic road freight with 73% of freight goods being moved by road in 2014. Lorry traffic saw the largest year-on-year increase since the 1980s, growing by 3.7% from 2014, whilst van traffic continued to grow more quickly than any other vehicle type, rising 4.2% from 2014 levels<sup>322</sup>.

In 2015, the number of reported road fatalities decreased by 3% to 1,730 compared to 2014. This is the second lowest annual total on record after 2013. There were 45 per cent fewer fatalities in 2015 than a decade earlier in 2006<sup>323</sup>.

### Rail

Over the last two decades there has been substantial growth in rail usage, and rail passenger journeys are now at their highest level since the 1920s. An average of 4.7 million journeys per day are made in Great Britain. The majority of growth has been in the London and the South East, and 64% of journeys either start or end in London.

Around 12% of all freight moved in Great Britain was by rail in 2014. In 2015-16, freight moved by rail was 18 billion net tonne km, down 20% from 2014-15. This decrease was mainly due to a decline in the amount of coal moved, which has fallen substantially (72%) since 2005-06.<sup>324</sup>

### Aviation

There are 58 airports in the UK, with Heathrow being the largest and accounting for twice as many passengers and air transport movements as that next largest airport, Gatwick<sup>325</sup>. Air traffic in the UK has been rising steadily. In 1953 there were 195,000 air traffic movements, by 2015 this figure was 2,111,000. In this time, both the number of passengers flying and the amount of freight transported has risen dramatically to 251.4 million passengers and 2.3 million tonnes respectively<sup>326</sup>.

### Water

The UK has 51 Major Ports, defined as ports with cargo volumes of at least 1 million tonnes annually, including Sullom Voe; Forth; Tees and Hartlepool; Hull; Grimsby and Immingham; Felixstowe; Harwich; London; Ramsgate; Dover; Portsmouth; Southampton; Milford Haven; Holyhead; and Liverpool. Overall total

<sup>321</sup> Department for Transport (2016) *Road Lengths in Great Britain 2015 Report*. Available online at: <https://www.gov.uk/government/statistics/road-lengths-in-great-britain-2015>

<sup>322</sup> Department for Transport (2016) *Traffic Estimates: Great Britain 2015*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/524261/annual-road-traffic-estimates-2015.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/524261/annual-road-traffic-estimates-2015.pdf)

<sup>323</sup> Department for Transport (2016) *Reported Road Casualties Great Britain: 2015 Annual Report*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/590561/rail-trends-factsheet-2016-revised.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/590561/rail-trends-factsheet-2016-revised.pdf)

<sup>324</sup> Department for Transport (2017) *Rail Trends Factsheet*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/590561/rail-trends-factsheet-2016-revised.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/590561/rail-trends-factsheet-2016-revised.pdf)

<sup>325</sup> Department for Transport (2016) *Transport Statistics Great Britain 2015*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/489894/tsgb-2015.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/489894/tsgb-2015.pdf)

<sup>326</sup> Department for Transport (2016) *Air traffic at UK airports (AVI01)*. Available online at: <https://www.gov.uk/government/statistical-data-sets/avi01-traffic-passenger-numbers-mode-of-travel-to-airport>

## Traffic and Transport

freight tonnage declined by 1 per cent in 2015 with 496.7 million tonnes being handled by UK ports in 2015. Whilst tonnage fell marginally, reflecting reduced demand for coal and ores, changes in steel production, and lower dependency on food imports, unitised traffic experienced a third consecutive year of growth.<sup>327,328</sup>

### England

#### Road

England has a road infrastructure network of approximately 303,000 km (as at 2015), of which 12% comprises major roads.<sup>329</sup> The average speed on local 'A' roads in England during the weekday morning peak in the year ending December 2015 was 23.4 mph. This is a 0.7% decrease on the year ending September 2015<sup>330</sup>.

Over the last two decades the rate of car traffic growth has slowed. For an average person, car use fell throughout the 2000s, but this was partially offset by an increase in population using the roads. Van traffic has grown faster than car traffic on all types of road in recent years. HGV vehicles are travelling less distance, but carrying more goods since the 1990s, owing to a shift away from using smaller HGV vehicles towards larger vehicles or vans. HGV traffic has not yet returned to pre-recession levels. Recent trends show a resumption of traffic growth after the recession. Growth has been strongest on the SRN and for van traffic across all roads<sup>331</sup>.

#### Rail<sup>332</sup>

In 2014/15, 70% of Great Britain rail journeys were made with London and South East operators.

#### Aviation<sup>333</sup>

Heathrow is the busiest airport in the UK, followed by Gatwick and Manchester, with approximately 75 million passengers in 2015<sup>334</sup>. The other major airports in London are Gatwick, Luton, Stansted and London City, and other major airports in England include Birmingham, Bristol, Newcastle, East Midlands International and Liverpool (John Lennon).

#### Water

Grimsby and Immingham remained England and the UK's busiest port in terms of tonnage, handling 12 per cent of the UK market in 2015 with 59.1 million tonnes of goods. Grimsby and Immingham overtook London

<sup>327</sup> Department for Transport (2016) *UK Port Freight Statistics: 2015*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/555338/port-freight-statistics-2015.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/555338/port-freight-statistics-2015.pdf)

<sup>328</sup> Department for Transport (2015) *Domestic Waterborne Freight, 2014*. Available online at:

<https://www.gov.uk/government/statistics/domestic-waterborne-freight-2014>

<sup>329</sup> Department for Transport (2016) *Road Lengths in Great Britain 2015 Report*. Available online at:

<https://www.gov.uk/government/statistics/road-lengths-in-great-britain-2015>

<sup>330</sup> Department for Transport (2016) *Congestion on local 'A' roads, England: October to December 2015 Report*. Available online at:

<https://www.gov.uk/government/statistics/congestion-on-local-a-roads-england-october-to-december-2015>

<sup>331</sup> Department for Transport (2016) *Road use statistics Great Britain*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/514912/road-use-statistics.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/514912/road-use-statistics.pdf)

<sup>332</sup> Department for Transport (2016) *Rail passenger numbers and crowding on weekdays in major cities in England and Wales: 2015*.

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/541587/rail-passengers-crowding-2015.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/541587/rail-passengers-crowding-2015.pdf)

<sup>333</sup> Department for Transport (2016) *Air traffic at UK airports*. Available online at

<https://www.gov.uk/government/statistical-data-sets/avi01-traffic-passenger-numbers-mode-of-travel-to-airport>

<sup>334</sup> CAA (2016). *Summary of Activity at Reporting Airports 2015*. Available online at

[http://www.caa.co.uk/uploadedFiles/CAA/Content/Standard Content/Data and analysis/Datasets/Airport stats/Airport data 2015/Table\\_02\\_2\\_Summary Of Activity at UK Airports 2015.pdf](http://www.caa.co.uk/uploadedFiles/CAA/Content/Standard Content/Data and analysis/Datasets/Airport stats/Airport data 2015/Table_02_2_Summary Of Activity at UK Airports 2015.pdf)



## Traffic and Transport

as the busiest port in 2000. It also accounted for the largest share of the UK's dry bulk traffic at 18 per cent (19.1 million tonnes). However, dry bulk tonnage at this port has decreased by 10 per cent compared to the previous year<sup>335</sup>.

In 2015, goods moved by domestic water transport accounted for 15% of total domestic freight transport in the UK.

### Modes of Transport

The 2011 Census highlighted that the majority people in England travelled to work by car. The breakdown of methods of travel to work is as follows<sup>336</sup>:

- working mainly at or from home – 3.5 % (1,349,568 persons);
- underground, metro, light rail, tram – 2.6% (1,027,625 persons);
- train – 3.5% (1,343,684 persons);
- bus, minibus or coach – 4.9% (1,886,539 persons);
- taxi – 0.3% (131,465 persons);
- motorcycle, scooter or moped – 0.5% (206,550 persons);
- driving a car or van – 36.9% (14,345,882 persons);
- passenger in a car or van -3.3% (1,264,553 persons);
- bicycle – 1.9% (742,675 persons);
- walking – 6.9% (2,701,453 persons);
- other method of travel to work – 0.4% (162,727 persons); and
- not in employment 35.3% (13,718,653 persons).

UK Census data also indicates that the average distance travelled to work in England and Wales increased from 13.4km in 2011 to 15.0km in 2011<sup>337</sup>.

## Scotland

### Road

There were 56,092 km of road in Scotland as of 2015. Of this, 6.4% (3,578 km) is Trunk road, which the Scottish Ministers are responsible for managing, whilst the remaining 52,514 km are managed by Local

<sup>335</sup> Department for Transport (2016) *UK Port Freight Statistics: 2015*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/555338/port-freight-statistics-2015.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/555338/port-freight-statistics-2015.pdf)

<sup>336</sup> ONS (2011) *Method of Travel to Work in England and Wales – 2011*. Available online at: <http://www.ons.gov.uk/ons/rel/census/2011-census-analysis/method-of-travel-to-work-in-england-and-wales/sty-method-of-travel-to-work.html>

<sup>337</sup> ONS (2014) *2011 Census Analysis - Distance Travelled to Work*. Available online at: [http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/dcp171776\\_357812.pdf](http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/dcp171776_357812.pdf)

## Traffic and Transport

Authorities. There were 601 km of motorways, 775 km of dual carriageways and 27,674 km of single carriageway in Scotland in 2015<sup>338</sup>.

### Rail

There were 93.2 million passengers carried by ScotRail in 2015/16, an increase of 34% since 2005/6. As of 2015/2016 there were 358 stations and 2,819 km of rail network in Scotland<sup>339</sup>.

### Aviation

There were 25.5 million air passengers at Scottish airports in 2015. Three quarters travel to or from Edinburgh or Glasgow. A total of 56 thousand tonnes of freight were carried by air in 2015<sup>340</sup>.

### Water

There were 44 million tonnes of freight lifted by water transport in Scotland in 2015 (around a quarter of freight lifted in Scotland, including exports). There was a total of 7.8 million passengers and 2.7 million vehicles carried on ferry routes within Scotland in 2015. There were 1.7 million passengers and 0.4 million vehicles carried between Scotland and Northern Ireland and 43,000 vehicles carried between Scotland and Europe in 2015<sup>341</sup>.

### Modes of Transport

According to the 2011 Census results<sup>342</sup> of the 2.1 million 16 to 74 year olds in employment (excluding full-time students) who travel to work, 63 per cent (1.3 million) drove a car or van, an increase from 59 per cent in 2001. The next most common methods of transport, both at 11 per cent, were travelling by bus, minibus or coach (241,000) and on foot (238,000). The proportions travelling by bus and on foot had both decreased slightly from 12 per cent in 2001.

## Wales

### Road

The total road length in Wales in 2015-16 was 34,642 km. Unclassified minor surfaced roads contribute approximately half the total road length in Wales<sup>343</sup>.

<sup>338</sup> Transport Scotland (2016) *Scottish Transport Statistics No 53 2016 Edition Chapter 4: Road Network*. Available online at: <https://www.transport.gov.scot/publication/scottish-transport-statistics-no-35-2016-edition/SCT01171871341-07>

<sup>339</sup> Transport Scotland (2016) *Scottish Transport Statistics No 35 2016 Edition Chapter 7: Rail Services*. Available online at: <https://www.transport.gov.scot/publication/scottish-transport-statistics-no-35-2016-edition/SCT01171871341-10>

<sup>340</sup> Transport Scotland (2016) *Scottish Transport Statistics No 35 2016 Edition Chapter 8: Air Transport*. Available online at: <https://www.transport.gov.scot/publication/scottish-transport-statistics-no-35-2016-edition/SCT01171871341-11>

<sup>341</sup> Transport Scotland (2016) *Scottish Transport Statistics No 35: 2016 Edition Chapter 9: Water Transport*. Available online at: <http://www.transport.gov.scot/statistics/j357783-12.htm>

<sup>342</sup> Scotland's Census (2013) *Census 2011: Key results on Households and Families, and Method of Travel to Work or Study in Scotland - Release 2C*. Available online at:

<http://www.scotlandscensus.gov.uk/news/census-2011-key-results-households-and-families-and-method-travel-work-or-study-scotland>

<sup>343</sup> Welsh Government (2017) *Road Lengths and Conditions 2014-15*. Available online at: <http://gov.wales/statistics-and-research/road-lengths-conditions/?lang=en>

## Traffic and Transport

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### Rail

The numbers of rail passenger journeys in Wales have been increasing over the last decade. There were 30.3 million rail passenger journeys which either started or ended in Wales in 2015-16, an increase of 3.4 per cent when compared to the previous year. Over two-thirds (68 per cent) of these journeys were within Wales. Rail passenger journeys within Wales have increased annually with approximately 20.7 million journeys reported in 2015-16 which is a 3.7 per cent increase on the 2014-15 figures<sup>344</sup>.

### Aviation

The total number of passengers using Cardiff International Airport increased by nearly 14 per cent between 2014 and 2015, to over 1.15 million. During 2015 there were 24 domestic routes and 73 international routes that operated out of Cardiff Airport. There were just over 15,000 commercial aircraft movements at Cardiff International Airport. There were just under 10,000 non-commercial aircraft movements making just over 25,000 in total<sup>345</sup>.

### Water

In Wales during 2015 total freight traffic through Welsh ports was 56.4 million tonnes (Mt). Of this, 40.4 Mt were goods inwards and 15.9 Mt were goods outwards. Welsh ports accounted for 11 per cent of the total United Kingdom (UK) port traffic of 496.7 Mt.

## 12.4 Summary of Existing Problems Relevant to the Water Resources NPS

The following existing problems for traffic and transport have been identified:

- There are areas of the UK's transport network which are stretched beyond their capacity at peak times.
- Increasing levels of congestion are being experienced on the UK's road network.
- There is a need for investment in transportation infrastructure to meet future demand and support economic growth.
- There is a need to reduce the need to travel and facilitate a shift towards more sustainable modes of transport.

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<sup>344</sup> Welsh Government (2017) *Rail Transport*. Available online at: <http://gov.wales/statistics-and-research/rail-transport/?lang=en>

<sup>345</sup> Welsh Government (2016) *Air Transport*. Available online at: <http://gov.wales/statistics-and-research/air-travel/?lang=en>

## Traffic and Transport

### 12.5 Likely Evolution of the Baseline

#### UK

##### Road

Between 195 and 2015, the distance travelled by motor vehicles increased by 18.6%. In 2015, a total of 316.7 billion miles were travelled by all motor vehicles in the UK, an increase of 7.3 billion miles since 2013<sup>346</sup>.

England's road traffic is expected to increase by between 19 - 55% above 2010 levels by 2040. Whilst new technologies will provide some relief through better use of network capacity, more highly automated vehicles may also be part of the problem by stimulating demand<sup>347</sup>.

##### Rail

The **National Policy Statement for National Networks (Department for Transport, 2014)**<sup>348</sup> highlights that passenger demand is predicted to continue to grow significantly, by 50.1% by 2033 with long distance rail passenger travel increasing by 63.8%. Total rail freight, meanwhile, is forecast to grow by 3% annually to 2043.

The All-Party Parliamentary Group for High-Speed Rail's Report of the Inquiry into Britain's Rail Capacity highlights that if the current growth rate of demand continued for a sustained period, current infrastructure would be inadequate and incremental upgrades such as those suggested by Rail Package 2 (RP2) and 51m's 'Optimised Alternative' would be insufficient to accommodate the demand. It states that, given recent passenger growth and the country's overall economic and transport strategy, the risks from under providing rail capacity seem higher than the risks of overprovision. In this context, the UK Government has identified a need for development of the national rail network at the strategic level including the development of strategic rail freight interchanges and new high-speed lines.

##### Aviation

Demand for air travel is forecast to increase within the range of 1% - 3% a year up to 2050, compared to historical growth rates of 5% a year over the last 40 years. The slowdown in growth rates in the future reflects the anticipation of market maturity across different passenger markets and a projected end to the long-term decline in average fares seen in the last two decades<sup>349</sup>.

The central forecast from the 2013 analysis, taking into account the impact of capacity constraints, is for passenger numbers at UK airports to increase from 219 million passengers in 2011 to 315 million in 2030 and 445 million by 2050. This is an increase of 225 million passengers over the next 40 years compared to an increase of 185 million since 1970. The major south east airports are forecast to be full by 2030. However, there is a range around this projection and they could be full as soon as 2025 or as late as 2040. Heathrow remains full across all the demand cases considered by the DfT.

<sup>346</sup> Department for Transport (2016) *Traffic Estimates: Great Britain 2015*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/524261/annual-road-traffic-estimates-2015.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/524261/annual-road-traffic-estimates-2015.pdf)

<sup>347</sup> Reese Jeffrys (2016) *A major road network for England*. Available online at:

<http://www.futureroadsengland.org/>

<sup>348</sup> Department for Transport (2014) *National Policy Statement for National Networks*. Available online at:

[https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/387222/npsnn-print.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387222/npsnn-print.pdf)

<sup>349</sup> Department for Transport (2013) *UK Aviation Forecasts*. Available online at:

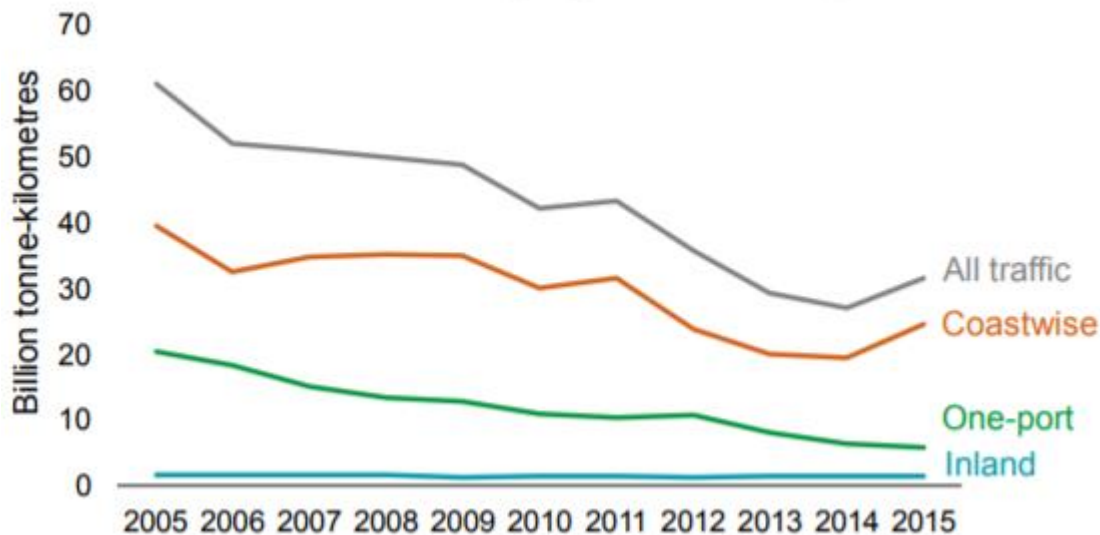
<https://www.gov.uk/government/publications/uk-aviation-forecasts-2013>

## Traffic and Transport

### Water

**Figure 12.1** shows the trend data for domestic water transport. There is an overall downward trend for coastwise (traffic carried around the coast from one UK port to another) and one-port (traffic to and from offshore locations, such as oil rigs and sea dredging) freight good moved, noting the increase in coastwise transport in 2015. Freight goods movements via inland waterways has remained largely static since 2015.

Figure 12.1 Domestic waterborne freight goods moved, 2005-2015



Source: Department for Transport

### England

The latest forecasts conducted by the DfT predict that compared to the 2010 baseline (and under a central scenario), road traffic will be between 19% and 55% higher by 2040. Cars are the dominant mode of road transport and are forecast to remain so in spite of a slight reduction in the proportion of total traffic they make. Cars made up 80% of traffic miles in 2010 and are forecast to make up between 73% and 80% of traffic miles in 2040, whereas light goods vehicles (LGVs) made up 14% in 2010 and this is forecast to be in the range 15% to 20% in 2040. HGVs comprise 6% of total traffic in 2010 and this is forecast to be in the range of 4% to 6% in 2040<sup>350</sup>.

### Scotland

Trends in Scotland are expected to mirror the broader UK, with a continuing increase in the total distance travelled by car and an increase in traffic congestion. Rail and air passenger numbers are also expected to continue to increase<sup>351</sup>.

<sup>350</sup> Department for Transport (2015) *Road Traffic Forecasts 2015*. Available online at: [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/411471/road-traffic-forecasts-2015.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/411471/road-traffic-forecasts-2015.pdf)

<sup>351</sup> Transport Scotland (2017) *Transport Statistics*. Available online at: <https://www.transport.gov.scot/our-approach/statistics/>

## Traffic and Transport

### Wales

Motor traffic in Wales peaked in 2015 at 28.4 billion vehicle kilometres, which is 1.5 per cent higher than the previous peak in 2007 and represents a 1.8 per cent increase on 2014. Road traffic would therefore be expected to continue to increase. Rail journeys are increasing by 3-4% year on year and would be expected to continue to increase<sup>352</sup>.

## 12.6 Assessing Significance

The objectives and guide questions related to traffic and transport which have been identified for use in the appraisal of the effects of the Water Resources NPS proposals are set out in **Table 12.1**, together with reasons for their selection.

Table 12.1 Approach to Assessing the Effects of the Water Resources NPS on Traffic and Transport

Objective/Guide Question	Reasoning
<b>Objective: To minimise the volume of traffic and promote more sustainable transport choices.</b>	<p>Whilst traffic and transport is not specifically referred to in the SEA Directive (2001/42/EC), the issue is a significant one in the case of the nationally significant water resource infrastructure given the scale, duration and extent of construction, operation, decommissioning and closure.</p> <p>The construction and operation of large scale water resources infrastructure projects can result in increased traffic volumes and may involve pipeline works within/across roads which in-turn can lead to an increase in congestion on road networks and driver delay. The inclusion of this AoS objective ensures that these effects can be considered within the AoS.</p>
Will the Water Resources NPS help to minimise traffic volumes?	Traffic, comprising heavy goods vehicles, passenger vehicles and trains can have a significant influence over noise, air quality, climate change, wildlife habitats and quality of life of communities in the vicinity of operations. The control of traffic volumes will help to minimise these effects.
Will the Water Resources NPS help to minimise the direct effects of transport such as noise and vibration, severance <sup>1</sup> of communities and wildlife habitats and safety concerns?	Minimising the direct effects of traffic and transport on people and the environment is a key aim of national planning policy, and by extension issues such as human health in the SEA Directive. As such, these effects should be taken into consideration in the planning and management of traffic associated with implementing the NPS.
Will the Water Resources NPS encourage alternative and sustainable means of transporting freight, waste and minerals, where possible?	The development and use of sustainable transport is a major theme in national planning policy and as such, transport substitution (for example road to rail) wherever possible is encouraged, as well as trip minimisation. In turn this will help to meet air quality targets set locally, nationally and internationally.

<sup>1</sup> Community severance is defined as the cumulative impact of transport infrastructure on the perceptions, behaviour, and wellbeing of people who use the surrounding areas

**Table 12.2** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the traffic and transport objective.

<sup>352</sup> Welsh Government (2016) *Statistics and research*. Available online at: <http://gov.wales/statistics-and-research/road-traffic/?lang=en>

## Traffic and Transport

Table 12.2 Illustrative Guidance for the Assessment of Significance for Traffic and Transport

Effect	Description	Illustrative Guidance
++	Significant Positive	<ul style="list-style-type: none"> <li>Option would make a significant positive and long-term contribution to minimising the direct and indirect effects of traffic and transport associated with nationally significant water resources infrastructure.</li> </ul>
+	Positive	<ul style="list-style-type: none"> <li>Option would make a positive contribution to minimising the direct and indirect effects of traffic and transport associated with nationally significant water resources infrastructure.</li> </ul>
0	Neutral	<ul style="list-style-type: none"> <li>Option would not have any effects on traffic and transport.</li> </ul>
-	Negative	<ul style="list-style-type: none"> <li>Option would have minor, short-term adverse effects associated with the direct and indirect impacts of traffic and transport related to nationally significant water resources infrastructure.</li> </ul>
--	Significant Negative	<ul style="list-style-type: none"> <li>Option would cause significant long-term effects associated with the direct and indirect impacts of traffic and transport associated nationally significant water resources infrastructure.</li> </ul>
?	Uncertain	<ul style="list-style-type: none"> <li>From the level of information available, the effect that the option would have on this objective is uncertain.</li> </ul>

## Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 12.3** presents the appraisal of the likely significant effects of the draft NPS and the 'no NPS' alternative on the traffic and transport objective. The appraisal considers in-turn the three sub-sections used for each topic within Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making and Mitigation. The performance of the draft NPS and the 'no NPS' alternative are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters 1 – 3 of the draft NPS outlining how the remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the 'no NPS' alternative is then summarised along with any proposed mitigation measures.

## Traffic and Transport

Table 12.3 Appraisal of the Draft NPS and Reasonable Alternatives: Traffic and Transport

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	+	+/?	<p><b>Draft NPS:</b> The text in the draft NPS under the heading of 'Applicant's Assessment' states:</p> <p>4.14.3 "If a proposed development is likely to have significant transport implications, the applicant's Environmental Statement should include a transport assessment. Applicants should consult Highways England, highway authorities, the railway network operator(s), Network Rail, the Maritime and Coastguard Agency, the relevant navigation authorities and Associated British Ports, as appropriate, on the assessment and on any proposed mitigation measures. The assessment should distinguish between the construction and operation stages if appropriate. The assessment should illustrate accessibility to the site by all modes of transport and the likely split by each mode of travel to and from the site."</p> <p>Alongside guidance on the scope of an Environmental Statement (ES), the draft NPS also sets out that applicants should prepare a travel plan including details of proposed measures to improve access to development so as to mitigate traffic and transport impacts and promote accessibility by non-car modes.</p> <p>The requirement for the preparation of an ES with an associated transport assessment and travel plan, alongside consultation with Highways England, the highway authorities and other consultees, will help to ensure that effects associated with the construction and operation of new water resources infrastructure on traffic and transport are properly considered and mitigation measures identified. The consideration of all modes of travel and their modal split will additionally help to minimise the transportation of materials, waste and workers by road where possible. Overall, this has been assessed as having a positive effect on this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>Specific guidance could be provided on the contents of a travel plan, taking into account the impacts and opportunities associated with different types of water resources infrastructure. This could include guidance in respect of maintaining/increasing accessibility to new water resources infrastructure (such as reservoirs for recreational use), provision for walking and cycling and road safety.</p> <p>There is no detailed guidance on the potential contents that should form part of the ES. It would be useful to supplement the current information with equivalent guidance. Specification of the contents of the ES could be drawn from the following which in turn serves as the reference point for the detail of the 'Decision Making' section:</p> <ul style="list-style-type: none"> <li>• Scoping</li> </ul>



## Traffic and Transport

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>○ A description of the traffic-generating aspects of the development proposal leading to impacts on traffic and transport.</li> <li>○ A description of the baseline, including the principal modal routes, and for the road network.</li> <li>○ Provide the methodological basis for determining significance of effects and the scope of effects to be assessed.</li> <li>• Impact assessment <ul style="list-style-type: none"> <li>○ Details regarding vehicle movements (using peak, 18 hours and AADT information) and the forecast changes in traffic movements (without the proposed development).</li> <li>○ A prediction of how the traffic and transport baseline will change with the proposed development: <ul style="list-style-type: none"> <li>▪ in the shorter term, such as during the construction period;</li> <li>▪ in the longer term, during the operating life of the infrastructure; and</li> <li>▪ at particular times of the day, evening and night as appropriate.</li> </ul> </li> <li>○ An assessment of the significance of effects of any predicted changes.</li> </ul> </li> <li>• Avoidance, mitigation, compensation and enhancement <ul style="list-style-type: none"> <li>○ Identify and incorporate measures to avoid, reduce and compensate for traffic and transport impacts, and where possible enhance beneficial effects.</li> <li>○ Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.</li> </ul> </li> </ul>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and the EIA Regulations. Further, proposals would continue to be identified through the WRMP process which would be expected to include the consideration of effects on traffic and transport. However, the absence of a clear statement on the full range of information to be submitted, with regards to traffic and transport in the ES (as proposed in the draft NPS) risks development not effectively mitigating traffic and transport impacts. Notwithstanding this, a no NPS alternative would still be considered to have a positive effect the traffic and transport AoS objective, although a degree of uncertainty persists.</p>

## Traffic and Transport

Draft NPS Section	Draft NPS	No NPS	Appraisal
Decision Making	+	+/?	<p><b>Draft NPS:</b> The draft NPS indicates that where a proposed development may give rise to substantial impacts on the surrounding transport infrastructure, the Secretary of State, as decision maker, should ensure that the applicant has sought to mitigate these impacts. Where such impacts cannot be reduced, applicants may enter into planning obligations for funding infrastructure and mitigating adverse impacts.</p> <p><u>Recommendations for Improvement</u></p> <p>This section could usefully include specific reference to the consideration of modal split in decisions taken by the Secretary of State, road safety and opportunities to promote accessibility to development proposals.</p>
			<p><b>No NPS:</b> Under this alternative, DCO applications will be subject to the provisions of national planning policy and the EIA Regulations which would be considered to have a positive, albeit uncertain, effect against the traffic and transport AoS objectives. The uncertain effects arise from the absence of a clear statement of the role of the Secretary of State in seeking to ensure that the applicant has mitigated adverse impacts (as proposed in the draft NPS).</p>
Mitigation	+	+/?	<p><b>Draft NPS:</b> The measures contained in the 'Mitigation' section include the consideration of demand management. This is, if feasible and operationally reasonable, preferred before considering other requirements and imposing new transport infrastructure to mitigate any identified adverse impacts on transport. However, in determining applications, the draft NPS sets out that the Secretary of State should have regard to the cost effectiveness of demand management measures compared to new transport infrastructure. The Secretary of State should also aim to secure more sustainable patterns of transport development when considering mitigation measures.</p> <p>The draft NPS indicates that where there are considerations between rail, water-borne or road transport, rail and water-borne options are preferred over road transport, where safe and cost-effective. It also sets out a number of scenarios where there is likely to be substantial HGV traffic and how an applicant could control the quantity of HGV movements, make sufficient provision for HGV parking and ensure satisfactory arrangements for such disruption. Additionally, the draft NPS makes clear that the Secretary of State may attach requirements or require obligations to any development consent in order to ensure such arrangements are delivered.</p> <p>More specific mitigation measures are provided in the 'Introduction' section.</p> <p>Overall, it is considered that the draft NPS makes a positive contribution to this AoS objective.</p> <p><u>Recommendations for Improvement</u></p>

## Traffic and Transport

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>To inform the appraisal of this section of the draft NPS, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on traffic and transport has been undertaken. This review is intended to help identify where any additional measures could be included in the draft NPS (in the introduction or mitigation section of the topic) to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p> <p>The following text identifies the anticipated traffic and transport impacts and associated mitigation measures. These have been identified within the draft NPS and are discussed again here to provide the necessary context for the recommended mitigation measures.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p> <p><i>Construction</i></p> <p>As identified in the draft NPS, the construction of new or enlarged reservoirs and any associated infrastructure would be likely to generate a significant volume of vehicle movements necessary for the movement of materials, waste and workers to/from sites. There may also be a requirement for associated pipeline works within/across roads. Depending on the location of development and the capacity of the highways network, this could result in congestion and driver delay as well as road safety impacts. Vehicle movements also have the potential to cause nuisance to the host community and impacts on wildlife and habitats.</p> <p>The construction of new reservoirs/enlargement of existing reservoirs may require the temporary (and possibly permanent) closure of public rights of way which could affect opportunities for walking and cycling.</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, vehicle movements associated with the operation of reservoirs would be expected to be small and associated traffic and transport impacts minor.</p> <p><b>Water Transfer Schemes</b></p> <p><i>Construction</i></p> <p>As identified in the draft NPS, the construction of water transfer schemes and any associated infrastructure would be likely to generate a significant volume of vehicle movements necessary for the movement of materials, waste and workers to/from sites. There may also be a requirement for associated pipeline works within/across roads over a wide area. Depending on the location of development and the capacity of the highways network, this could result in congestion and driver delay as well as</p>

## Traffic and Transport

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>road safety impacts. Vehicle movements also have the potential to cause nuisance to the local community and impacts on wildlife and habitats.</p> <p>The construction of water transfer schemes may require the temporary (and possibly permanent) closure of public rights of way which could affect opportunities for walking and cycling.</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, vehicle movements associated with the operation of water transfer scheme would be expected to be small and associated traffic and transport impacts minor.</p> <p><b>Desalination</b></p> <p><i>Construction</i></p> <p>Effects as per construction effects for reservoirs.</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, vehicle movements would be generated during the operation of a desalination plant associated with the transportation of workers, maintenance, deliveries and waste arisings. Whilst it is not anticipated that the volume of movements would be significant, there may be minor adverse impacts on the local road network in the vicinity of development sites.</p> <p><b>Potential additional mitigation measures identified through a review draft WRMPs and their associated SEA Environmental Reports include:</b></p> <ul style="list-style-type: none"> <li>• Where possible, works affecting roads (such as pipeline works) should be timed so as to minimise adverse impacts on the highways network.</li> <li>• Opportunities to enhance accessibility to existing and proposed infrastructure (for example, reservoirs) and to promote walking and cycling as part of a development should be considered as part of a Travel Plan.</li> </ul> <p><b>No NPS:</b> Under this alternative, appropriate mitigation measures will be considered by applicants and the Secretary of State in light of the proposals submitted. As such, mitigation measures will be forthcoming but there is the risk that they are not comprehensive or consistent (without the direction and guidance given in the draft NPS) and so will not fully address any effects arising or could be accompanied by greater uncertainty.</p>

## Traffic and Transport

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Other Sections of the Draft NPS Relevant to Traffic and Transport</b>	<p>The following provides additional commentary on the text in the other sections of the draft NPS relevant to the traffic and transport. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b><u>1. Introduction</u></b></p> <p><b>1.1. Background and scope of this NPS</b> – reference to the AoS prepared in support of the draft NPS will help to ensure that the effects on traffic and transport are given proper consideration, notwithstanding the fact that there remains uncertainty over potential impacts, particularly in respect of the absence of specific locations and likely effects within the draft NPS.</p> <p>With regards to para 1.1.8, there is an opportunity for the consideration of effects on traffic and transport in a specific locality through the preparation of a local impact report submitted by a local authority in accordance with the Planning Act 2008. There is no prescribed format for local impact reports but there is clearly an opportunity for a local authority to comment on relevant issues, helping to ensure that consideration is given to likely effects in a particular locality.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on traffic and transport in Scotland and Wales.</p> <p><b>1.3. Infrastructure covered by the Water Resources NPS</b> – as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, it is anticipated that early consideration will be given to the impacts of options on traffic and transport.</p> <p><b><u>2. Government policy and the need for water resources infrastructure</u></b></p> <p><b>2.5. The role of water resource management plans in identifying the need</b> – as noted, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, it is anticipated that early consideration will be given to the impacts of options on traffic and transport. This is reflected in paragraph 2.5.7.</p> <p><b>2.6 The role of nationally significant infrastructure projects</b> – the section identifies that alongside reservoirs, water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP, when assessed against the relevant threshold in the Planning Act 2008 or through a section 35 referral. These infrastructure types may have traffic and transport impacts of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p> <p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p><b><u>3. Assessment Principles</u></b></p>		

## Traffic and Transport

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<p><b>3.1 General principles of assessment</b> – the provisions of the Planning Act 2008 and the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, provides the starting point for the ensuring a sustainable approach to transport is promoted.</p> <p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, it is anticipated that early consideration will be given to the impacts of options on traffic and transport.</p> <p><b>3.2 Environmental Impact Assessment</b> – the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that effects on traffic and transport are fully considered, as will the consideration of cumulative effects and interrelationships between effects.</p> <p>This section specifically highlights that information gathered from the WRMP options assessments and the draft NPS will also be useful to identify the significant effects of a proposed project.</p> <p><b>3.5 Assessing Alternatives</b> – the requirement that reasonable alternatives will need to be considered as part of scheme design and project planning, including as part of the WRMP options appraisal process, should ensure that traffic and transport related issues are taken into account.</p> <p><b>3.6 Criteria for 'good design' for water resources infrastructure</b> – the requirement for good, sustainable design may encourage applicants to consider accessibility to/from development sites including alternative means of transport to road-based travel.</p> <p><b>3.9 Common Law Nuisance and Statutory Nuisance</b> – no direct relationship identified. However, there is an indirect relationship in terms of adverse effects arising from transport associated with the construction and operation of water resources infrastructure which may be perceived as a nuisance. During examination, possible sources of nuisance under Section 79(1) of the Environmental Protection Act 1990 and how they may be mitigated or limited is considered by the Examining Authority. This will enable the Examining Authority to recommend appropriate requirements that the Secretary of State may wish to include in any subsequent order granting development consent.</p> <p><b>3.12 Health</b> – notes that where a proposed development has a direct or indirect effect on human health, the ES should assess these effects for each element of the project, including in respect of traffic and transport, identifying any adverse health impacts and mitigation measures to avoid, reduce or compensate for such impacts as appropriate.</p>		
<b>Summary Appraisal of Likely Significant Effects</b>	+	+/?	<p><b>Draft NPS:</b> The transportation of materials, wastes and personnel during the construction (and in some cases operation) of water resources infrastructure may have a wide range of impacts on the surrounding transport infrastructure, users of that infrastructure and on other connecting networks. Development may also affect accessibility. In this context, the draft NPS seeks to ensure that significant transport impacts are identified through an ES and associated transport assessment and, aided by a travel plan, mitigated appropriately. The Secretary of State must ensure that significant impacts are mitigated against, during both the construction and operational phases of development and that planning obligations or requirements are</p>

## Traffic and Transport

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>sought where necessary. Mitigation measures, where required, must have regard for demand management measures whilst also ensuring that cost-effectiveness is considered. The draft NPS favours the use of rail over road but sufficient scope is included to allow for road movements.</p> <p>Overall, it is considered that the implementation of the draft NPS is likely to result in a positive effect in respect of minimising traffic volumes and promoting sustainable transport choices.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and the EIA Regulations. Further, proposals would continue to be identified through the WRMP process which would be expected to include the consideration of effects on traffic and transport. However, the absence of a clear statement on the full range of information to be submitted with regards to traffic and transport (as proposed in the draft NPS) risks development not effectively mitigating traffic and transport impacts. Similarly, the absence of a clear statement on the role of the Secretary of State, including ensuring that development avoids significant adverse transport impacts, risks uncertain effects on the receptors and their surroundings. It is considered that mitigation measures would be forthcoming under this reasonable alternative but there is the risk that they would not fully address the range of impacts associated with nationally significant water resources infrastructure.</p> <p>Overall, this alternative has been assessed as having a positive effect on this AoS objective, although some uncertainty remains.</p>
<b>Summary of Recommended Mitigation and Enhancement</b>	<p>The draft NPS makes a positive contribution to the traffic and transport AoS objective. However, it is considered that section 4.14 of the draft NPS could be enhanced through, in particular:</p> <ul style="list-style-type: none"> <li>strengthening of linkages to the PPG;</li> <li>the provision of further guidance on the possible contents of a Travel Plan and ES;</li> <li>the inclusion of specific reference to the consideration of modal split in decisions taken by the Secretary of State, alongside road safety and opportunities to promote accessibility to development proposals.</li> </ul> <p>Additional project-level mitigation for inclusion in the draft NPS is suggested based on a review of draft WRMPs and their associated SEA Environmental Reports. This includes:</p> <ul style="list-style-type: none"> <li>Where possible, works affecting roads (such as pipeline works) should be timed so as to minimise adverse impacts on the highways network.</li> </ul>		

**Traffic and Transport**

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<ul style="list-style-type: none"><li>• Opportunities to enhance accessibility to existing and proposed infrastructure (for example, reservoirs) and to promote walking and cycling as part of a development should be considered as part of a Travel Plan.</li></ul>		



## Cultural Heritage

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# 13. Cultural Heritage

## 13.1 Introduction

This section presents the overview of plans, programmes and baseline information for the appraisal of sustainability of the National Policy Statement for Water Resources in respect of cultural heritage.

Cultural heritage, including architectural and archaeological heritage, within this context is defined as all aspects of the environment resulting from the interaction between people and places through time, including all surviving physical remains of past human activity, whether visible, buried or submerged, and landscaped and planted or managed flora.

There are links between the cultural heritage topic and other topics in the Appraisal of Sustainability (AoS), specifically landscape and townscape and land use, geology and soils.

## 13.2 Review of Plans and Programmes

The plans and programmes seek to maintain and enhance the range of historic assets in the UK. The *Strategy for Water and Wetland Heritage (2012)* is an importance piece of guidance for water resources infrastructure in providing specific emphasis on wetland archaeology, which due to the local conditions is often very well maintained but also easily lost if an area is permanently flooded or damaged if a wetland dries out.

### International/European

The **UNESCO World Heritage Convention (1972)** aims to promote co-operation amongst nations to protect heritage that is of such outstanding value that its conservation is important for current and future generations. The Convention also established a register of World Heritage Sites. It is intended that properties on the World Heritage List will be conserved for all time. UNESCO member states commit themselves to ensure the identification, protection, conservation, and presentation of World Heritage properties.

The World Heritage Committee's **Operational Guidelines for the Implementation of the World Heritage Convention (2013)** set out the procedures for: the inscription of properties on the World Heritage List and the List of World Heritage in Danger; the protection and conservation of World Heritage properties; the granting of International Assistance under the World Heritage Fund; and the mobilisation of national and international support in favour of the Convention.

The **Valletta Convention 1992**, formally known as **Convention for the Protection of the Archaeological Heritage of Europe** was originally signed in London in 1969 but was revised in Valletta in 1992. It is a Europe-wide international treaty which establishes the basic common principles to be applied in national archaeological heritage policies. It supplements the general provisions of the UNESCO World Heritage Convention and aims to protect archaeological heritage as a source of the European collective memory and as an instrument for historical and scientific study. It sets out a framework which requires Member States to:

- maintain an inventory of archaeological heritage and designated protected monuments and areas;
- create archaeological reserves; and
- for finders of any element of archaeological heritage, to report and make it available to the competent authority.

## Cultural Heritage

It defines archaeological heritage as: “all remains and objects and any other traces of mankind from past epochs shall include structures, constructions, groups of buildings, developed sites, moveable objects, monuments of other kinds as well as their context, whether situated on land or under water”. The emphasis is on protection of sites for future study, the reporting of chance finds the control of excavations and the use of metal detectors.

### UK

The **Historic Buildings and Ancient Monuments Act 1953** provides the legislative basis for statutory agencies to prepare the parks and gardens and battlefields registers.

The **Ancient Monuments and Archaeological Areas Act 1979** provides for the scheduling of ancient monuments and offers the only legal protection specifically for archaeological sites in the UK. The **Planning (Listed Buildings and Conservation Areas) Act 1990** outlines the level of protection received by listed buildings and Conservation Areas in England and Wales.

There are a number of other Acts which afford protection to cultural and historical assets, including the **Protection of Wrecks Act 1973**, which provides protection for shipwrecks of historical, archaeological or artistic value<sup>353</sup>; the **Protection of Military Remains Act (1986)**, which provides protection for the wreckage of military aircraft and designated military vessels, and the **Treasure Act (1996)**, which sets out procedures for dealing with finds of treasure, its ownership and rewards, in England, Wales and Northern Ireland.

The **Enterprise and Regulatory Reform Act 2013** made a number of changes to the specialised heritage protection system that affect heritage protection<sup>354</sup>:

- heritage partnership agreements may be entered into between local authorities and owners setting out works for which listed building consent is granted (excluding demolition);
- local or national Listed Building Consent Orders may be set up by a Local Planning Authority or the Secretary of State, respectively, under which works of the type described in the Order (excluding demolition) will not need listed building consent;
- a certificate of lawful proposed works is introduced (valid for 10 years) that categorically confirms that the works described in it do not affect the character of the listed building and do not therefore require consent;
- the extent of protection of a listed building can be better defined by excluding attached buildings and structures and those within the curtilage of the principal listed building from protection, and by stating definitively that some feature of a listed building is not of special architectural or historic interest;
- a certificate of immunity from listing may be applied for at any time; and
- conservation area consent has been replaced with planning permission.

### England

The **National Planning Policy Framework (MHCLG, 2018)** sets out the core land use planning principles that should underpin both plan-making and decision-taking and in doing so expects planning to “conserve

<sup>353</sup> Note that Section 1 of the Protection of Wrecks Act 1973 was repealed in Scotland on 1 November 2013. Sites in Scottish territorial waters previously designated under this legislation have been designated as Historic Marine Protection Areas under the Marine (Scotland) Act 2010, or de-designated altogether.

<sup>354</sup> <https://www.historicengland.org.uk/advice/hpg/HP>

## Cultural Heritage

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heritage assets in a manner appropriate to their significance, so that they can be enjoyed for their contribution to the quality of life of this and future generations”.

Section 12 of the Framework sets out the approach to conserving and enhancing the historic environment. In particular, at paragraph 126 it stipulates that local planning authorities should set out in their Local Plan a positive strategy for the conservation and enjoyment of the historic environment. In addition, it provides (at paragraph 131) that in determining planning applications, local planning authorities should take account of: the desirability of sustaining and enhancing the significance of heritage assets and putting them to viable uses consistent with their conservation; the positive contribution that conservation of heritage assets can make to sustainable communities and their economic vitality; and the desirability of new development making a positive contribution to local character and distinctiveness.

As heritage assets are irreplaceable, the Framework expects any harm or loss to require clear and convincing justification. Where a proposed development will lead to substantial harm to, or total loss of, significance of a designated heritage asset, “local planning authorities should refuse consent, unless it can be demonstrated that the substantial harm or loss is necessary to achieve substantial public benefits that outweigh that harm or loss”, or all of the criteria set out in paragraph 133 (mostly relating to the lack of a viable use) apply.

**National Planning Practice Guidance (2014)**, ‘Conserving and enhancing the historic environment’, provides further guidance on the application of heritage policies contained in the NPPF. It sets out that “*The conservation of heritage assets in a manner appropriate to their significance is a core planning principle. Heritage assets are an irreplaceable resource and effective conservation delivers wider social, cultural, economic and environmental benefits.*” The Guidance, amongst other elements, refines the definition of a logical hierarchy of heritage significance and provides clarification on the definition of the term ‘optimum viable use’, which is the use likely to cause the least harm to the significance of an asset, not just through necessary initial changes, but also as a result of subsequent wear and tear and likely future changes. Guidance is also provided on how to assess whether there is likely to be ‘substantial harm’ as a result of a proposal. Additionally, the Guidance provides a description of ‘public benefits’, identifying that public benefits may include heritage benefits such as sustaining or enhancing the significance of a heritage asset and the contribution of its setting or reducing or removing risks to a heritage asset.

Historic England, the Government’s statutory adviser on the historic environment in England, and its predecessor organisations have published a number of relevant guidance documents, including the following:

- Preserving Archaeological Remains (2016);
- Conservation Area Designation, Appraisal and Management: Historic England Advice Note 1 (2016);
- Historic Environment Good Practice Advice in Planning Note 2: Managing Significance in Decision-Taking in the Historic Environment (2015);
- Historic Environment Good Practice Advice in Planning Note 3: The Setting of Heritage Assets (2015);
- The Historic Environment and Site Allocations in Local Plans. Historic England Advice Note 3 (2015);
- Sustainability Appraisal and Strategic Environmental Assessment. Historic England Advice Note 8 (2016); and
- Conservation Principles, Policies and Guidance for the Sustainable Management of the Historic Environment (2008).

## Cultural Heritage

Historic England's **Strategy for Water and Wetland Heritage (2012)** sets out Historic England's approach to the management of historic assets in wetland environments.

### Scotland

The framework for the protection and management of the Scottish historic environment is underpinned mainly by two pieces of UK legislation:

- **The Ancient Monuments and Archaeological Act 1979**; and,
- **Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997**.

The **Historic Environment (Scotland) Act 2014** made substantial amendments to this framework and established the new governing body of Historic Environment Scotland as a Non-Departmental Public Body to carry out the statutory functions previously delivered by Historic Scotland and the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS), which were dissolved in 2015.

**Scottish Historic Environment Policy (2011)** sets out Scottish Ministers' policies for the historic environment, including the following key outcomes:

- that the historic environment is cared for, protected and enhanced for the benefit of our own and future generations;
- to secure greater economic benefits from the historic environment; and
- the people of Scotland and visitors understand and enjoy the historic environment.

Following the merger of Historic Scotland and the Royal Commission on the Ancient and Historical Monuments of Scotland, the first-ever overarching strategy for Scotland's historic environment was published in March 2014. "**Our Place in Time – The Historic Environment Strategy for Scotland**" (2014) contains a number of key aims including:

- to ensure that the cultural, social, environmental and economic value of heritage continues to make a major contribution to the nation's wellbeing;
- to investigate and record the historic environment to continually develop knowledge, understanding and interpretation of the past and how best to conserve, sustain and present it;
- to care for and protect the historic environment in order to both enjoy and benefit from it and conserve and enhance it for future benefit of future generations; and
- sharing and celebrating the richness and significance of the historic environment, enabling us to enjoy the fascinating and inspirational diversity of the heritage.

In relation to land use planning, the **National Planning Framework 3 (2014)** recognises the value of Scotland's historic environment and its world-renowned built heritage as a key asset<sup>355</sup>. Whilst the **Scottish Planning Policy (SPP) (2014)** reflects the value of the historic environment as a key part of Scotland's cultural heritage. The SPP (2014) sets out that with the careful application of policy and sensitive decision making, the historic environment can often be adapted to accommodate new uses, offering opportunities for new and creative design, whilst retaining its special character. In principle, therefore, the aim should be to identify the best viable use that is compatible with the fabric, setting and character of the historic environment, whilst also seeking to protect, enhance and promote access to cultural heritage.

The **Historic Environment Scotland Policy Statement (2016)** takes account of the Historic Environment (Scotland) Act 2014 and explains how provisions within the NPF3 2014) and SPP (2014) relating to the

<sup>355</sup> <http://www.gov.scot/Topics/Built-Environment/planning/National-Planning-Framework>

## Cultural Heritage

management of the historic environment should be interpreted. The document does not set out any planning policies or development management assessment criteria, however it does state that there should be a “presumption in favour of preservation of individual historic assets and also the pattern of the wider historic environment”. Historic Environment Scotland has also published a revised ***Managing Change in the Historic Environment: Setting guidance note*** (June 2016) to align with the Historic Environment Scotland Policy Statement (2016).

**Planning Advice Note: (PAN) 2/2011** provides guidance to developers on the treatment of archaeological remains which is proportionate to the relative value of the remains and of the developments under consideration **Planning Advice Note PAN 71: Conservation Area Management** (December 2004) identifies good practice for managing change to secure the protection and enhancement of conservation areas, sets out a checklist for appraising conservation areas and provides advice on funding and implementation.

**Conserving the Underwater Heritage (2008)** contains a number of policies on the management of the underwater historic environment whose key objective is to develop a protection regime which is effective in securing the long-term future of the most important underwater sites, including securing them against inadvertent or deliberate damage or destruction.

## Wales

The framework for the protection and management of the Welsh historic environment is underpinned mainly by two pieces of UK legislation:

- The ***Ancient Monuments and Archaeological Act 1979***; and
- The ***Planning (Listed Buildings and Conservation Areas) Act 1990***.

The ***Historic Environment (Wales) Act 2016*** amends and augments this framework for the protection and sustainable management of the Welsh historic environment. In broad terms, the Act: creates new measures for the protection of listed buildings and scheduled monuments; enhances existing mechanisms for the sustainable management of the historic environment; and introduces greater transparency and accountability into decisions taken on the historic environment.

***The Well-being of Future Generations (Wales) Act 2015*** aims to improve the social, economic, environmental and cultural well-being of Wales. For those public bodies listed in the Act, it encourages a more joined-up approach to consider more long term, work better with people and communities and each other to prevent problems.

***Planning Policy Wales (9th Edition 2016)*** has the following objectives regarding the historic environment:

- to preserve or enhance the historic environment, recognising its contribution to economic vitality and culture, civic pride and the quality of life, and its importance as a resource for future generations;
- to protect archaeological remains, which are a finite and non-renewable resource, part of the historical and cultural identity of Wales, and valuable both for their own sake and for their role in education, leisure and the economy, particularly tourism;
- to ensure that the character of historic buildings is safeguarded from alterations, extensions or demolition that would compromise a building’s special architectural and historic interest; and
- to ensure that conservation areas are protected or enhanced, while at the same time remaining alive and prosperous, avoiding unnecessarily detailed controls over businesses and householders.

## Cultural Heritage

**Technical Advice Note 12 (TAN 12): Design (2016)** sets out the Welsh Government's policy and advice in respect of the design of new development, including sustaining or enhancing local character.

Cadw is preparing new draft policy, advice and guidance documents to supplement the legislative changes in the Historic Environment (Wales) Act 2016. These will be consistent with the **Conservation Principles (2011)** published by Cadw for the sustainable management of the historic environment in Wales. These will help local planning authorities, third sector groups, owners and developers to manage change in the historic environment.

### 13.3 Overview of the Baseline

#### UK

The UK has over 459,000 listed buildings, approximately 33,720 scheduled monuments, 2,416 historic parks and gardens, in excess of 10,259 conservation areas and 28 World Heritage Sites.

#### England

In England, there are approximately 377,943 listed building entries, 19,849 scheduled monuments, 1,664 registered historic parks and gardens, approximately 9,793<sup>356</sup> conservation areas<sup>357</sup>, 47 registered historic battlefields, 53 designated wrecks and 19 World Heritage Sites.

Historic England's **Heritage at Risk Register (2017)**<sup>358</sup> identifies sites most at risk of being lost as a result of neglect, decay or inappropriate development. There are fewer entries on the 2017 register (5,254) than the 2016 Register (5,341) and in turn the 2015 Register (5,478). Historic England report the following findings:

- 2,101 (0.6%) of England's listed buildings are on the Register;
- 468 conservation areas in England are on the list;
- 2,537 (12.8%) of England's 19,849 scheduled monuments are on the Register;
- 96 (5.8%) of England's 1,664 registered parks and gardens are on the Register;
- Of the 47 registered battlefields in England, 4 (8.5%) are on the Register;
- 4 (7.5%) of the 53 protected wreck sites around England's coast are on the Register.

In addition to the designated historic assets above, England also contains an extensive number of non-designated historic assets. These are buildings, monuments, sites, places, areas or landscapes identified as having a degree of significance meriting consideration in planning decisions but which are not formally designated heritage assets; local Historic Environment Records and local lists identify non-designated heritage assets. Paragraph 194 of the NPPF identifies that non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets.

In 2000, Historic England (as English Heritage) commissioned the University of Exeter to research Monuments at Risk in England's Wetlands. This study suggested that over the past 50 years, approximately half of

<sup>356</sup> Leo Hall (2017) *A New Inventory of English Conservation Areas*. Available online at:

<http://www.bedfordpark.net/leo/planning/A%20new%20inventory%20of%20English%20Conservation%20Areas.pdf>

<sup>357</sup> Conservation areas are created by local planning authorities. There is currently no single comprehensive national list.

<sup>358</sup> Historic England (2017) *Heritage at Risk Register 2017*. Available online at:

<https://historicengland.org.uk/whats-new/news/heritage-at-risk-2016>



## Cultural Heritage

England's original lowland peatlands have been lost and that as a result, around 3000 wetland archaeological sites have been lost and 10,000 damaged<sup>359</sup>.

Under the National Heritage Protection Plan (NHPP), research was carried out from 2011 to 2015 that identified wetland and waterlogged archaeological sites to help prevent their loss. The research identified those wetland and waterlogged sites considered to be of exceptional evidential value with a view to future projects reviewing the site-specific risks to their continued preservation and reviewing management options to win better protection where possible. In total, the NHPP "3A5 Identification of Wetland/ Waterlogged Sites" report identified 39 sites of exceptional value. The full details of those sites are set out in the inventory report<sup>360</sup>.

### Scotland

In Scotland there are approximately 8,238 scheduled monuments in excess of 47,000 listed buildings<sup>361</sup>, in excess of 600 conservation areas, six World Heritage Sites, and more than 275 sites listed in the Inventory of Historic Parks, Gardens and Designed Landscapes. There are also seven Historic Marine Protected Areas<sup>362</sup> and over 35 Inventory Battlefields<sup>363</sup>.

### Wales

In Wales there are over 4,000 scheduled monuments, 30,000 listed buildings, 500 conservation areas, 3 World Heritage Sites, almost 400 historic parks and gardens, and 6 designated historic wrecks<sup>364</sup>.

Since 2011, the percentage of buildings 'at risk' or in vulnerable condition has decreased from 9.22% to 8.92%<sup>365</sup>. The Historic Landscapes Register for Wales has identified 58 landscapes across Wales which are regarded as representing the best examples of the variety of historic landscapes in Wales.

## 13.4 Summary of Existing Problems Relevant to the Water Resources NPS

The following existing problems for cultural heritage have been identified:

- Wetlands are fragile and vulnerable to subtle changes arising from development that can affect paleoenvironmental deposits and archaeological assets. Other aspects of the wider historic environment that could be affected include disruption to historically important water sources, the flooding or drying of deep archaeological sites and assets such as mills and bridges which can be affected by local water levels.

<sup>359</sup> Historic England (2017) *Wetland and Waterlogged Heritage Survey NHPP Activity 3A5*. Available online at: <https://historicengland.org.uk/research/research-results/activities/3a5>

<sup>360</sup> Historic England (2013) *NHPP 3A5 Identification of Wetland/ Waterlogged Sites*. Available online at: <https://content.historicengland.org.uk/images-books/publications/6240-exceptional-waterlogged-heritage-stage1-inventory/6240-stage1-web-report-v2.pdf/>

<sup>361</sup> Historic Environment Scotland (2017) *Designations*. Available online at: <http://data.historic-scotland.gov.uk/pls/htmldb/f?p=2300:30:0>

<sup>362</sup> Scottish Government (2017) *Historic Marine Protected Area Records*. Available online at: <https://www.historicenvironment.scot/advice-and-support/listing-scheduling-and-designations/marine-heritage/historic-marine-protected-area-records/>

<sup>363</sup> Historic Environment Scotland (2016) *Scotland's Inventory of Historic Battlefields 2016*. Available online at: <https://www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=c59262de-b652-4e68-b88d-a5fe008ff1c8>

<sup>364</sup> Cadw (2016) *Protection*. Available online at: <http://cadw.gov.wales/historicenvironment/protection/?lang=en>

<sup>365</sup> Cadw (2016) *Buildings at Risk*. Available online at: <http://cadw.gov.wales/historicenvironment/recordsv1/buildingsatrisk/?lang=en>

## Cultural Heritage

- The impact of climate change on wetland heritage is currently poorly understood. Measures introduced to protect and enhance natural environmental qualities (water quality or biodiversity) may also inadvertently threaten wetland heritage if not handled sensitively.
- The settings of some heritage assets are at risk from new development.
- Scheduled monuments in rural areas are at risk from agricultural practices, land disturbance and unrestricted plant, scrub or tree growth.
- Challenging economic conditions are reducing the funds available to conserve and manage heritage assets.

### 13.5 Likely Evolution of the Baseline

Key findings from the latest Buildings at Risk and Heritage at Risk registers are reported in section 13.3. Whilst these do not provide projections regarding the future state of the historic environment, they do indicate the level of known heritage assets which require ongoing conservation, protection and care.

Climate change poses an unknown risk to wetland archaeological remains, which may be exacerbated by future climate scenarios.

### 13.6 Assessing Significance

The objectives and guide questions related to cultural heritage which have been identified for use in the appraisal of the effects of Water Resources NPS proposals are set out in **Table 13.1**, together with reasons for their selection.

Table 13.1 Approach to Assessing the Effects of the Water Resources NPS on Cultural Heritage

Objective/Guide Question	Reasoning
<b>Objective: To conserve and where appropriate enhance the historic environment including cultural heritage resources, historic buildings and archaeological features and their settings</b>	The SEA Directive (2001/42/EC) requires that the likely significant effects on cultural heritage including architectural and archaeological heritage should be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.  The construction and operation of large scale water resources infrastructure can have adverse impacts on the significance of heritage assets both directly (through the loss of, or damage to, assets) or indirectly (through effects on setting). The inclusion of this AoS objective ensures that these effects can be considered within the AoS.
Will it affect the significance of internationally and nationally designated heritage assets and their settings?	A number of legislative provisions require the protection of sites designated for archaeological or cultural heritage importance including the Ancient Monuments and Archaeological Areas Act 1979 and Planning (Listed Buildings and Conservation Areas) Act 1990.
Will the Water Resources NPS affect non-designated heritage assets, archaeological remains and their settings?	National planning policy in England requires the protection of the most important components of historic landscapes and encourages development that is consistent with maintaining its overall historic character.
Will the Water Resources NPS conserve or enhance heritage assets and the wider historic environment including landscapes, townscapes, buildings, structures and archaeological remains?	
Will the Water Resources NPS affect the fabric and setting of historic buildings, places or spaces that	



## Cultural Heritage

Objective/Guide Question	Reasoning
contribute to local distinctiveness, character and appearances?	
Will the Water Resources NPS affect the heritage of communities?	Designations such as World Heritage Sites and National Parks recognise the contribution and importance of cultural heritage and landscapes to communities and which are a function of the interaction between human traditions, landscape and the environment. These could be affected by development including water resource infrastructure.
Will the Water Resources NPS avoid damage to important wetland areas with potential for paleoenvironmental deposits?	Research under the National Heritage Protection Plan (NHPP) identified wetland and waterlogged archaeological sites to help prevent their loss.
Will the Water Resources NPS improve access to, and interpretation, understanding and appreciation of, the significance of heritage assets?	Water resource infrastructure can include protected cultural structures that then attract visitors e.g. Derwent Reservoir.

**Table 13.2** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the cultural heritage objective.

Table 13.2 Illustrative Guidance for the Assessment of Significance for Cultural Heritage

Effect	Description	Illustrative Guidance
++	Significant Positive	<ul style="list-style-type: none"> <li>Option would make a significant positive and long-term contribution to the setting and conservation of designated and locally important cultural heritage features (e.g. through enhancement of setting, permanent removal of a structure creating a negative visual impact, large scale enhancement of designated features).</li> </ul>
+	Positive	<ul style="list-style-type: none"> <li>Option would bring minor short-term improvements to the setting and conservation of designated and locally important cultural heritage features (e.g. temporary removal of a structure creating a negative visual impact).</li> </ul>
0	Neutral	<ul style="list-style-type: none"> <li>Option would not have any significant effects on any cultural heritage sites or assets or their setting.</li> </ul>
-	Negative	<ul style="list-style-type: none"> <li>Option would result in short-term degradation to the setting and conservation of designated and locally important cultural heritage features (e.g. temporary use of equipment/structures creating a negative visual impact).</li> </ul>
--	Significant Negative	<ul style="list-style-type: none"> <li>Option would cause long-term degradation to the setting and conservation of designated and locally important cultural heritage features (e.g. through direct and permanent loss or damage to assets or the introduction of a structure that will have a considerable and permanent negative visual impact).</li> </ul>
?	Uncertain	<ul style="list-style-type: none"> <li>From the level of information available, the effect that the option would have on this objective is uncertain.</li> </ul>

## Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 13.3** presents the appraisal of the likely significant effects of the draft NPS and the 'no NPS' alternative on the cultural heritage objective. The appraisal considers in-turn the three sub-sections used for each topic within Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making and Mitigation. The performance

## Cultural Heritage

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of the draft NPS and the 'no NPS' alternative are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters 1 – 3 of the draft NPS outlining how the remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the 'no NPS' alternative is then summarised along with any proposed mitigation measures.

## Cultural Heritage

Table 13.3 Appraisal of the Draft NPS and Reasonable Alternatives: Cultural Heritage

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	+	+/?	<p><b>Draft NPS:</b> Under the 'Applicants Assessment' section, the draft NPS states:</p> <p>4.7.7 "Where the development is subject to Environmental Impact Assessment the applicant should undertake an assessment of any likely significant heritage impacts, including cumulative, of the proposed project as part of the Environmental Impact Assessment and describe these in the environmental statement."</p> <p>4.7.8 "The applicant should provide, as part of the environmental statement, a description of the significance of the heritage assets affected by the proposed development, and the contribution of their setting to that significance. The level of detail should be proportionate to the asset's importance, and no more than is sufficient to understand the potential impact of the proposal on the significance of the asset. Consideration will also need to be given to the possible impacts, including cumulative, on the wider historic environment. As a minimum, the relevant Historic Environment Record should be consulted and the heritage assets assessed using appropriate expertise where necessary. Where a site on which development is proposed includes or has the potential to include heritage assets with archaeological interest, the applicant should include an appropriate desk-based assessment and, where necessary, a field evaluation. The applicant should ensure that the extent of the impact of the proposed development on the significance of any heritage asset affected can be adequately understood from the application and supporting documents."</p> <p>4.7.9 "The applicant is encouraged, where opportunities exist, to prepare proposals which can make a positive contribution to the historic environment, and to consider how their scheme takes account of the significance of heritage assets affected."</p> <p>The guidance in this section, which requires the consideration of the effects of proposals on the significance of historic assets (including archaeological interests), will help to ensure that adverse effects on cultural heritage are avoided or mitigated at the project stage. Additionally, the draft NPS may help to ensure that opportunities are identified to enhance the historic environment through, for example, sensitive design and addressing assets at risk.</p> <p>Overall, there are likely to be positive effects on cultural heritage.</p> <p><u>Recommendations for improvement</u></p> <p>It would be useful for the text in this section of the draft NPS to make direct reference to the Planning Practice Guidance (PPG) on how cultural heritage matters should be dealt with as part of a development consent application (PPG Conserving and</p>

## Cultural Heritage

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>enhancing the Historic Environment). Direct reference should also be made to the guidance issued by Historic England, including in particular 'Good Practice Advice in Planning' Parts 2 and 3.</p> <p>This section could highlight the importance of ongoing engagement with Historic England and the local planning authority (although it is noted that this is referred to in a footnote. Consideration could also be given to including reference to non-designated assets in this section together with the historic character of landscapes and settlements as well as the heritage of communities.</p> <p>There is no detailed guidance on the potential contents that should form part of the ES. It would be useful to supplement the current information with equivalent guidance. Specification of the contents of the ES could be drawn from the following which in turn serves as the reference point for the detail of the 'Decision Making' section:</p> <ul style="list-style-type: none"> <li>• Scoping <ul style="list-style-type: none"> <li>○ Identify the legislative, regulatory and policy context for the assessment;</li> <li>○ Identify a zone of influence or study area;</li> <li>○ Identify and evaluate the significance of archaeological and built heritage receptors (including both statutory and locally listed buildings) within the study area, including any contribution to their setting;</li> <li>○ Describe any future anticipated changes to the baseline in the absence of the proposed infrastructure, to inform the assessment of impacts.</li> <li>○ Provide the methodological basis for determining significance of effects and the scope of effects to be assessed.</li> </ul> </li> <li>• Impact Assessment <ul style="list-style-type: none"> <li>○ Undertake desk-based assessments and a walkover survey, incorporating the results of a detailed geophysical survey, which will inform the need for, and scope of, any further field surveys that may be required.</li> <li>○ Assess the impacts of the proposed development on the significance of historic assets and their setting.</li> <li>○ Assess the residual impacts of the project remaining after mitigation and the significance of their effects, including cumulative effects.</li> </ul> </li> <li>• Avoidance, mitigation, compensation and enhancement</li> </ul>

## Cultural Heritage

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>Identify and incorporate measures to avoid, reduce and compensate for cultural heritage impacts, and where possible, enhance beneficial effects.</li> <li>Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.</li> </ul>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and the EIA Regulations. This would be expected to help ensure that adverse effects on historic assets associated with new water resources infrastructure are identified, assessed and appropriately mitigated. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on historic assets. However, the absence of a clear statement on the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation and unintended consequences through implementation. However, this reasonable alternative is considered to have a positive, albeit uncertain, effect against the cultural heritage AoS objective.</p>
<b>Decision Making</b>	+	+/?	<p><b>Draft NPS:</b> The draft NPS sets out in detail the range of considerations that will be part of the decision making process, including the importance of understanding the significance of the historic assets (including non-designated assets) which could be affected (including their setting) and opportunities for their enhancement where appropriate. The guidance reflects policy set out in the NPPF with regard to conserving and enhancing the historic environment (section 16, paras 192 – 202) and recognises that where historic assets are lost, they cannot be replaced.</p> <p>This section provides guidance in respect of when development consent should be refused on heritage grounds; at para 4.7.19, the draft NPS states “Where the proposed development will lead to substantial harm to or the total loss of significance of a designated heritage asset, the Secretary of State will refuse consent unless it can be demonstrated that the substantial harm or loss of significance is necessary in order to deliver substantial public benefits that outweigh that loss or harm, or alternatively that all of the following apply:</p> <ul style="list-style-type: none"> <li>The nature of the heritage asset prevents all reasonable uses of the site;</li> <li>No viable use of the heritage asset itself can be found in the medium term through appropriate marketing that will enable its conservation;</li> <li>Conservation by grant funding or some form of not for profit, charitable or public ownership is demonstrably not possible; and</li> </ul>

## Cultural Heritage

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li><i>The harm or loss is outweighed by the benefit of bringing the site back into use."</i></li> </ul> <p>Overall, it is considered that the draft NPS will help to ensure that impacts on heritage assets associated with the development of water resources infrastructure will be minimised and opportunities for enhancement promoted, although broader strategic development considerations, such as the need for new water resources infrastructure, could override cultural heritage interests where impacts cannot be avoided and there are substantial public benefits.</p> <p><u>Recommendations for Improvements</u></p> <p>None identified.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and the EIA Regulations. This would be expected to help ensure that adverse effects on historic assets associated with new water resources infrastructure are identified, assessed and appropriately mitigated. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on historic assets. However, the absence of a clear statement on the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation and unintended consequences through implementation, particularly at the project level. However, this reasonable alternative is considered to have a positive, albeit uncertain, effect against the cultural heritage AoS objective.</p>
Mitigation	+	+/?	<p><b>Draft NPS:</b> The proposed mitigation sets out that where the loss of the whole or part of a heritage asset's significance is justified, the Secretary of State will require the applicant to record and advance understanding of the significance of the heritage asset before it is lost. The section also requires the Secretary of State to ensure appropriate procedures are in place for the identification and treatment of as yet undiscovered heritage assets where there is a high probability that a site may contain them. More specific mitigation measures are provided in the table of potential impacts in the 'Introduction' section.</p> <p>Overall, it is considered that the draft NPS makes a positive contribution to this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>To inform the appraisal of this section of the draft NPS, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on cultural heritage has been undertaken. This review is intended to help identify where any additional measures could be included in the draft NPS (in the introduction or mitigation section of the topic) to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p>

## Cultural Heritage

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>The following text identifies the anticipated heritage impacts and mitigation measures. These have been largely identified within the draft NPS and are discussed again here to ensure that the description of impacts is clear and provides the necessary context for the recommended mitigation measures. Where impacts discussed here have not been included within the draft NPS, they have been clearly identified.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p> <p><i>Construction</i></p> <p>As identified in the draft NPS, the construction of new or enlarged reservoirs can have adverse impacts on the significance of heritage assets and archaeological remains both directly (through the loss of, or damage to, assets) or indirectly (through effects on setting); in this regard, many reservoirs/associated infrastructure are themselves listed.</p> <p>In addition to the effects identified in the draft NPS, there may be construction impacts on historic and valued cultural landscapes, particularly where a new reservoir is proposed.</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, once operational, new infrastructure may continue to affect the settings of heritage assets and landscapes. Additionally, any changes in flows downstream of a reservoir as a result of operation could affect heritage assets such as mills and bridges.</p> <p><b>Water Transfer Schemes</b></p> <p><i>Construction</i></p> <p>Effects on historic assets are as per the construction impacts for reservoirs.</p> <p>In addition, in the case of pipeline works, indirect impacts would likely be temporary.</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, whilst it is expected that pipelines associated with water transfer schemes would generally be buried, associated development such as water treatment works could continue to affect the settings of heritage assets.</p> <p>Changes in river flows associated with the operation of water transfer schemes could both positively and negatively affect the settings of heritage assets located in closed proximity to surface water bodies. There may also be impacts on wetlands, which are fragile and vulnerable to subtle changes arising from development that can affect paleoenvironmental deposits and</p>

## Cultural Heritage

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>archaeological assets, disruption to historically important water sources and the flooding or drying of deep archaeological sites.</p> <p><b>Desalination</b></p> <p><i>Construction</i></p> <p>As per the construction impacts for reservoirs.</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, once operational, new infrastructure may continue to affect the settings of heritage assets and landscapes.</p> <p><b>Potential additional mitigation measures identified through a review draft WRMPs and their associated SEA Environmental Reports include:</b></p> <ul style="list-style-type: none"> <li>Infrastructure should be designed to minimise the effect on the setting of nearby historic assets.</li> </ul>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and the EIA Regulations. This would be expected to help ensure that adverse effects on historic assets associated with new water resources infrastructure are identified, assessed and appropriately mitigated. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on historic assets. However, the absence of a clear statement on the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation and unintended consequences through implementation, particularly at the project level. However, this reasonable alternative is considered to have a positive, albeit uncertain, effect against the cultural heritage AoS objective.</p>
<b>Other Sections of the Draft NPS Relevant to Cultural Heritage</b>	<p>The following provides additional commentary on the text in the other sections of the draft NPS relevant to cultural heritage. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b><u>1. Introduction</u></b></p> <p><b>1.1. Background and scope of this NPS</b> – reference to the AoS prepared in support of the draft NPS will help to ensure that the possible effects on historic assets are given proper consideration, notwithstanding the fact that there remains uncertainty over potential impacts, particularly in respect of the absence of specific locations.</p>		



## Cultural Heritage

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>With regard to para 1.1.8, there is an opportunity for the consideration of effects on cultural heritage through the preparation of a local impact report submitted by a local authority in accordance with the Planning Act 2008. There is no prescribed format for local impact reports but there is clearly an opportunity for a local authority to comment on relevant issues, helping to ensure that consideration is given to likely effects in a particular locality.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on historic assets in Scotland and Wales.</p> <p><b>1.3. Infrastructure covered by the Water Resources NPS</b> – as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on historic assets.</p> <p><b><u>2. Government policy and the need for water resources infrastructure</u></b></p> <p><b>2.2. Pressure on water availability now and in the future</b> – this section makes specific reference to protecting and enhancing the environment (including heritage assets) as a key driver of the need for nationally significant water resources infrastructure.</p> <p><b>2.5. The role of water resource management plans in identifying the need</b> – as noted, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on cultural heritage. This is reflected in paragraph 2.5.7.</p> <p><b>2.6 The role of nationally significant infrastructure projects</b> – the section identifies that alongside reservoirs, water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP, when assessed against the relevant threshold in the Planning Act 2008 or through a section 35 referral. These infrastructure types may have cultural heritage impacts of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p> <p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p><b><u>3. Assessment Principles</u></b></p> <p><b>3.1 General principles of assessment</b> - the provisions of the Planning Act 2008 and the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, provides the starting point for the protection and enhancement of cultural heritage.</p> <p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on historic assets.</p>

## Cultural Heritage

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<p><b>3.2 Environmental Impact Assessment</b> – the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that effects on cultural heritage are fully considered, as will the consideration of cumulative effects and interrelationships between effects.</p> <p>This section specifically highlights that information gathered from the WRMP options assessments and the draft NPS will also be useful to identify the significant effects of a proposed project.</p> <p><b>3.5 Assessing Alternatives</b> – the requirement that reasonable alternatives will need to be considered as part of scheme design and project planning, including as part of the WRMP options appraisal process, should ensure that cultural heritage issues are taken into account, both in terms of protection and opportunities for mitigation and enhancement.</p> <p><b>3.6 Criteria for ‘good design’ for water resources infrastructure</b> – attention to good design principles and implementation will be of benefit to cultural heritage interests through the consideration of how proposed new water resources infrastructure interacts with its context. In this context, this section of the draft NPS states: <i>“There may be opportunities for the applicant to demonstrate good design in terms of site layout and design measures relative to existing landscape and historical character and function, landscape permeability, landform and vegetation whilst integrating biodiversity and nature conservation interests”</i>.</p>		
Summary Appraisal of Likely Significant Effects	+	+/?	<p><b>Draft NPS:</b> The development of nationally significant water resources infrastructure could have both direct (e.g. loss of or damage to an asset) or indirect (e.g. impacts on setting) effects on the significance of cultural heritage assets including archaeology. In this context, implementation of the draft NPS is likely to result in positive effects in respect of the conservation and enhancement of cultural heritage interests by providing a framework for the consideration of a range of potential impacts and mitigation.</p> <p>The draft NPS framework will be applied in light of existing legislation at international and national levels in principle protecting cultural heritage interests, although this will be a balancing exercise reflecting national need for infrastructure and other considerations.</p> <p>Where cultural heritage interests are affected, the draft NPS provides for the application of clear mitigation measures, which should result in positive effects. Further, the draft NPS identifies potential opportunities for enhancing assets associated with the development of water resources infrastructure.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy and the EIA Regulations. This would be expected to help ensure that adverse effects on historic assets associated with new water resources infrastructure are identified, assessed and appropriately mitigated. Further, proposals would continue to be identified through</p>

## Cultural Heritage

Draft NPS Section	Draft NPS	No NPS	Appraisal
			the WRMP process which would include the consideration of effects on historic assets. However, the absence of a clear statement on the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation and unintended consequences through implementation, particularly at the project level. However, this reasonable alternative is considered to have a positive, albeit uncertain, effect against the cultural heritage AoS objective.
<b>Summary of Recommended Mitigation and Enhancement</b>	<p>The draft NPS makes a positive contribution to the cultural heritage AoS objective. However, section 4.7 of the draft NPS could be enhanced through, in particular:</p> <ul style="list-style-type: none"> <li>strengthening of the linkages to the NPPF, PPG and other guidance in respect of the historic environment;</li> <li>recommending early pre-application engagement with relevant bodies including Historic England;</li> <li>provision of further guidance on the possible contents of an ES.</li> </ul> <p>Additional project-level mitigation for inclusion in the draft NPS is suggested based on a review of draft WRMPs and their associated SEA Environmental Reports. This includes:</p> <ul style="list-style-type: none"> <li>Infrastructure should be designed to minimise the effect on the setting of nearby historic assets.</li> </ul>		

## Landscape and Townscape

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# 14. Landscape and Townscape

## 14.1 Introduction

This section presents the overview of plans, programmes and baseline information for the appraisal of sustainability of the National Policy Statement for Water Resources in respect of landscape and townscape.

Landscape in this context is defined by The **European Landscape Convention** as *"an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors"*. This definition is stated as covering natural, rural, urban and peri-urban (i.e. the urban-rural fringe) and includes land, inland water and marine areas. For the purposes of this appraisal though, landscape is taken to apply to rural areas and townscapes in urban areas. Visual effects are those effects that influence how people see a landscape or townscape, such as the erection of a building.

There are links between the landscape and townscape topic and other topics in the Appraisal of Sustainability (AoS), including in particular biodiversity and nature conservation and cultural heritage.

## 14.2 Review of Plans and Programmes

The plans and programmes reviewed seek to protect and enhance the broad variety of landscapes and townscapes. The water environment is a key aspect of many of the most valuable landscapes including National Parks and as such any new water resources infrastructure would need be considered within the framework of policies that protect valued landscapes from adverse effects.

### International

The **European Landscape Convention 2004** is principally directed at the national level but emphasises the importance of landscape as a cultural as well as an aesthetic asset. The Convention also calls for improved public involvement in landscape matters. The UK became a signatory to the European Landscape Convention in 2006.

### UK

In the UK, there are numerous Acts governing the protection of the countryside, landscape and natural environment. The **National Parks and Access to the Countryside Act 1949** makes provision for National Parks, confers powers for the establishment and maintenance of nature reserves, makes provision for the recording, creation, maintenance and improvement of public paths and for securing access to open country and confers further powers for preserving and enhancing natural beauty.

National Parks are areas of relatively undeveloped and scenic landscape. Designation as a National Park may include substantial settlements and human land uses which are often integral parts of the landscape. Land within a National Park remains largely in private ownership. Each National Park is operated by its own National Park authority, with two 'statutory purposes':

- to conserve and enhance the natural beauty, wildlife and cultural heritage of the area; and
- to promote opportunities for the understanding and enjoyment of the Parks.

Areas of Outstanding Natural Beauty (AONBs) are areas of high scenic quality that have statutory protection in order to conserve and enhance the natural beauty of their landscapes. AONB landscapes range from

## Landscape and Townscape

rugged coastline to water meadows to gentle lowland and upland moors. Natural England has a statutory power to designate land as AONB in England, with Natural Resources Wales undertaking the role in Wales.

The **Environment Act 1995** revised the National Parks and Access to the Countryside Act 1949 and set out two statutory purposes for National Parks in England and Wales:

1. conserve and enhance the natural beauty, wildlife and cultural heritage; and
2. promote opportunities for the understanding and enjoyment of the special qualities of National Parks by the public.

When National Parks carry out these purposes they also have the duty to seek to foster the economic and social well-being of local communities. The Environment Act 1995 also updated the Sandford Principle to state *“if it appears that there is a conflict between those purposes, [the National Park Authority] shall attach greater weight to the purpose of conserving and enhancing the natural beauty, wildlife and cultural heritage of the area”*.

The **Countryside and Rights of Way Act 2000** increased the duty of provision of public access to the countryside and strengthened legislation relating to Sites of Special Scientific Interest (SSSIs). In particular, it requires public bodies to further the conservation and enhancement of SSSIs both in carrying out their operations, and in exercising their decision-making functions. With specific regard to AONBs, section 85 of the Act sets out that relevant authorities including statutory undertakers should have regard to the purpose of conserving and enhancing the natural beauty of AONBs.

The **Marine and Coastal Access Act 2009** seeks to ensure clean, healthy, safe, productive and biologically diverse oceans and seas, by putting in place better systems for delivering sustainable development of marine and coastal environment.

Other relevant Acts include:

- The Forestry Act 1967 restricts and regulates the felling of trees. The Countryside Act 1968 enlarges the function of the Agency established under the National Parks and Access to the Countryside Act 1949, to confer new powers on local authorities and other bodies for the conservation and enhancement of natural beauty and for the benefit of those resorting to the countryside;
- The Agriculture Act 1986 (with numerous revisions) covers the provision of agricultural services and goods, agricultural marketing compensation to tenants for milk quotas, conservation and farm grants; and
- The Commons Act 2006, which protects common land and promotes sustainable farming, public access to the countryside and the interests of wildlife.

## England

The **Natural Environment and Rural Communities Act 2006** ('the NERC Act') is designed to help achieve a rich and diverse natural environment and thriving rural communities through modernised and simplified arrangements for delivering Government policy. The NERC Act established a new independent body - Natural England - responsible for conserving, enhancing, and managing England's natural environment for the benefit of current and future generations. The Act made amendments to both the Wildlife and Countryside Act 1981 and the Countryside and Rights of Way Act 2000, which further enhance provisions to biodiversity generally and SSSIs in particular.

The **National Planning Policy Framework (NPPF) (MHCLG, 2018)** includes strong protections for valued landscapes and townscapes as well as recognising the intrinsic character and beauty of the countryside.

## Landscape and Townscape

Planning policies and decisions are expected to be sympathetic to local character and history, including the surrounding built environment and landscape setting, while not preventing or discouraging appropriate innovation or change. The Framework states (at paragraph 130) that: *"Permission should be refused for development of poor design that fails to take the opportunities available for improving the character and quality of an area and the way it functions"*.

The Framework has a number of specific requirements relating to planning and landscape including a clear expectation that the planning system should contribute to, and enhance, the natural and local environment by protecting and enhancing valued landscapes. Local planning authorities are expected to set criteria based policies against which proposals for any development on or affecting protected landscape areas will be judged. In doing so, distinctions should be made between the hierarchy of international, national and locally designated sites and "great weight" should be given to "conserving and enhancing landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty". It is also expected that the scale of development in these areas will be limited, with planning permission refused for major developments "other than in exceptional circumstances, and where it can be demonstrated that the development is in the public interest" (paragraph 172).

**National Planning Practice Guidance** provides guidance on the application of landscape policies. It sets out that planning policies and decisions should be based on up-to-date information about the natural environment and other characteristics of the area including management plans for National Parks and Areas of Outstanding Natural Beauty (AONBs).

The **Natural Environment White Paper (NEWP) The Natural Choice: securing the value of nature (2011)** recognises that a healthy natural environment is the foundation of sustained economic growth, prospering communities and wellbeing. It sets out how the value of nature can be mainstreamed across society by facilitating action; strengthening the connections between people and nature; creating a green economy and showing leadership in the EU and internationally. It sets out 92 specific commitments for an action and since its publication in 2011, Defra has published periodic NEWP implementation updates highlighting significant progress.

**A Green Future: Our 25 Year Plan to Improve the Environment (HM Government, 2018)** seeks to conserve and enhance landscape. It includes (inter alia) Government commitments to review National Parks and AONBs, work with National Park Authorities and AONB Partnerships and Conservation Boards to deliver environmental enhancement and to identify opportunities for environmental enhancement in all of England's National Character Areas.

## Scotland

The **Countryside (Scotland) Act 1967** makes provision for the better enjoyment of the Scottish countryside, the establishment of a Countryside Commission for Scotland and for the improvement of recreational and other facilities. The **National Parks (Scotland) Act 2000** provides the legislative framework for National Park designations in Scotland. The Land Reform (Scotland) Act 2003 establishes a right to be on land for recreational, educational and certain other purposes and a right to cross land. The Act also places a duty on each a local authority to prepare a Core Paths Plan and provides that access rights are exercisable in respect of all Core Paths.

The **Scottish Planning Policy (SPP) 2014** sets out several broad principles with regard to landscape, including taking a broader approach to landscape and natural heritage, considering the natural and cultural components of the landscape together, promoting opportunities for enhancement or restoration of degraded landscapes, safeguarding the character of the most sensitive landscapes, and considering potential effects on the landscape, including the cumulative effect of incremental changes, when deciding planning applications. SPP requires local authorities to apply the precautionary principle where the impacts of a

## Landscape and Townscape

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proposed development on nationally or internationally significant landscape or natural heritage resources are uncertain but there is sound evidence for believing that significant irreversible damage could occur.

Scotland's **Third National Planning Framework (NPF3)**, the spatial expression of the Government Economic Strategy, sets out a long-term vision for development and investment across Scotland over the next 20 to 30 years. NPF3 focuses on supporting sustainable economic growth and the transition to a low carbon economy. NPF3 sets out the ambition for Scotland as a whole, and highlights the distinctive opportunities for sustainable growth in the cities and towns, the rural areas and coast and islands. NPF3 will be taken into account in all strategic and local development plans in Scotland. Fourteen national developments across Scotland are identified to deliver the strategy.

**Planning Advice Note 60 (PAN60): Planning for Natural Heritage** provides guidance on how development and the planning system can contribute to the conservation, enhancement, enjoyment and understanding of Scotland's natural environment and encourages developers and planning authorities to be positive and creative in addressing natural heritage issues.

## Wales

The **Well-being of Future Generations (Wales) Act 2015** became law in Wales on 29th April 2015 and strengthens existing governance arrangements for improving the well-being of Wales to ensure that present needs are met without compromising the ability of future generations to meet their own needs. The act identifies goals to improve the well-being of Wales, introduces national indicators that will measure the difference being made to the well-being of Wales, establishes a Future Generations Commissioner for Wales to act as an advocate for future generations and puts local service boards and well-being plans on a statutory basis and simplifies requirements for integrated community planning.

The **Environment (Wales) Act 2016** establishes the principles that determine how the sustainable management of natural resources is to be delivered. The principles, which are complementary and interlinked, include requirements that the benefits provided by natural resources and ecosystems be identified and considered, as well as the intrinsic value of those ecosystems and resources, which is the value of natural resources and ecosystems for their own sake. All provisioning, supporting, regulating and cultural benefits (or services) should be considered, as appropriate, in the sustainable management of natural resources, recognising the explicit link between natural resources and wellbeing.

The **Planning (Wales) Act 2015** requires public bodies to exercise their functions relating to development plans and applications for planning permission as part of carrying out sustainable development, so that the development and use of land contribute to improving the well-being of Wales.

**Planning Policy Wales (Edition 9) (2016)** sets out several objectives regarding landscape, including promoting the conservation of landscape and biodiversity, ensuring that Wales contributes to meeting international responsibilities and obligations and ensuring that statutorily designated sites are properly protected and managed. It also notes that it is important that landscape considerations are taken into account at an early stage in both development plan preparation and development management.

**Technical Advice Note (TAN) 6: Planning for Sustainable Rural Communities (2010)** provides practical guidance on the role of the planning system in supporting the delivery of sustainable rural communities. The TAN seeks to protect and enhance Wales' landscapes.

**Technical Advice Note 12 (TAN 12): Design (2016)** sets out the Welsh Government's policy and advice in respect of the design of new development, including sustaining or enhancing local character.



## Landscape and Townscape

### 14.3 Overview of the Baseline

#### UK

Statutory sites designated (wholly or partially) for their landscape value include National Parks, Areas Outstanding Natural Beauty (AONBs) (in England and Wales), Country Parks, Historic Gardens and Designed Landscapes, National Scenic Areas (NSAs) and Regional Parks (in Scotland) and World Heritage Sites. Other important (non-statutory) sites include Areas of Great Landscape Value (AGLV) in Scotland; Heritage Coasts (in England and Wales); and National Trust/National Trust for Scotland properties.

The UK has 15 National Parks and (excluding Scotland) 46 AONBs. Each National Park is administered by its own National Park Authority whose duty it is to conserve and enhance natural beauty, wildlife and cultural heritage; and to promote opportunities for the understanding and enjoyment of the special qualities of National Parks by the public. The Broads Authority in England has a third purpose to protect the interests of navigation. The primary purpose of AONB is to conserve and enhance the natural beauty of the landscape.

#### England

England has been divided into areas with similar landscape character, which are called National Character Areas (NCAs). A total of 159 NCAs have been identified in England<sup>366</sup>. The boundaries of the NCAs are not precise and many should be considered as broad zones of transition. Natural England have rewritten and redesigned all of England's 159 NCA profiles and published the revised profiles in September 2014. The NCAs are defined by a unique combination of landscape, biodiversity, geodiversity, history, and cultural and economic activity.

There are ten National Parks in England; the most recently designated National Park being the South Downs National Park (designated on 31 March 2010). Together, National Parks cover 9.3% of the land area in England and include 453 conservation areas<sup>367</sup>.

There are 34 AONBs in England, one of which straddles England and Wales (the Wye Valley AONB). AONBs cover 18% of England and Wales<sup>368</sup>. The East Hampshire and Sussex Downs AONB designations were revoked on the 31 March 2010 when the South Downs National Park Designation Order came into effect.

England has been divided into areas with similar landscape character, which are called National Character Areas (NCAs). A total of 159 NCAs have been identified in England<sup>369</sup>. The boundaries of the NCAs are not precise and many should be considered as broad zones of transition. Natural England have rewritten and redesigned all of England's 159 NCA profiles and published the revised profiles in September 2014.

Heritage Coasts are areas defined (they are not statutorily designated) for the beauty and undeveloped nature of the coastline. They represent 1,057km of England's coastline and are managed to conserve their natural beauty and, where appropriate, to improve accessibility for visitors. Most Heritage Coasts are within the boundaries of National Parks or AONBs, although some including Lundy, the Durham Coast, and Flamborough Head stand alone<sup>370</sup>.

<sup>366</sup> Natural England (2014) *National Character Area profiles: data for local decision making*. Available online at: <https://www.gov.uk/government/publications/national-character-area-profiles-data-for-local-decision-making>

<sup>367</sup> National Parks (2016) *National park facts and figures*. Available online at: <http://www.nationalparks.gov.uk/learningabout/whatisanationalpark/factsandfigures>

<sup>368</sup> National Association of AONBs (2017) *Areas of Outstanding Natural Beauty*. Available online at: <http://www.landscapesforlife.org.uk/>

<sup>369</sup> Natural England (2014) *National Character Area profiles: data for local decision making*. Available online at: <http://www.naturalengland.org.uk/ourwork/landscape/englands/character/areas/default.aspx>

<sup>370</sup> Natural England (2006) *Review and evaluation of heritage coasts in England*. Available online at: <http://publications.naturalengland.org.uk/publication/4594438590431232?category=56001>



## Landscape and Townscape

There are 18 World Heritage Sites in England including Saltaire an exceptionally complete and well preserved industrial village of the second half of the 19th century, located on the river Aire<sup>371</sup>.

### Scotland

Scottish Natural Heritage identified a series of Natural Heritage Zones as part of their Natural Heritage Futures initiative, and used these areas to describe a vision for sustainable use of local natural heritage. A total of 21 zones were identified<sup>372</sup>, each having their own identity resulting from the interaction of geology, landforms, wildlife and land use.

Scotland has 40 National Scenic Areas (NSAs) covering more than one million hectares (12.7% of Scotland). The Planning etc. (Scotland) Act 2006 gives a statutory basis to NSAs. The purpose of the NSA designation is both to identify our finest scenery and to ensure it is protected from inappropriate development. This is achieved through the local authority planning system<sup>373</sup>. Other areas designated for their landscape include two National Parks and three Regional Parks together with a number of Special (local) Landscape Areas<sup>374</sup>.

There are six World Heritage Sites in Scotland: The Forth Bridge, St. Kilda; Old and New Towns of Edinburgh; the Frontiers of the Roman Empire; Heart of Neolithic Orkney; and New Lanark<sup>375</sup>.

The Scottish Government's third National Planning Framework, published in June 2014, recognises wild land as a "nationally important asset", and indicates Scotland's wildest landscapes merit strong protection. Scottish Natural Heritage published a new map of wild land areas in June 2014<sup>376</sup>. 'Wildness' in this context depends on four physical attributes, namely: the perceived naturalness of the land cover; the ruggedness of the terrain which is therefore difficult to cross; remoteness from public roads or ferries; and the visible lack of buildings, roads, pylons and other modern artefacts.

### Wales

National Landscape Character Areas<sup>377</sup> are defined at a broad landscape scale throughout Wales. The descriptive profiles for the 48 individual character areas highlight what distinguishes one landscape from another, with reference to their regionally distinct natural, cultural and perceptual characteristics. A total of 29 Marine Character Areas, meanwhile, highlight the key natural, cultural and perceptual influences that make the character of each seascape distinct and unique.

There are five AONBs in Wales, one of which straddles England and Wales (the Wye Valley AONB)<sup>378</sup>. Other areas designated for their landscape include three National Parks covering 20% of Wales (Brecon Beacons, Snowdonia and Pembrokeshire Coast National Park) and 495km of Heritage Coast.

<sup>371</sup> UNESCO (2017) *Properties inscribed on the World Heritage List for Great Britain and Northern Ireland*. Available online at: <http://whc.unesco.org/en/statesparties/gb>

<sup>372</sup> Scottish Natural Heritage (2002) *Natural Heritage Zones: A National Assessment of Scottish Landscapes*. Available online at: <http://www.snh.org.uk/futures/Data/pdfdocs/LANDSCAPES.pdf>

<sup>373</sup> Scottish Natural Heritage (2017) *National Scenic Areas*. Available online at: <http://www.scotland.gov.uk/Resource/Doc/1051/0095735.pdf>

<sup>374</sup> The term used for such local landscape designations varies from one local authority to another. For example, they are currently termed 'Areas of Great Landscape Value' in Moray, 'Special Landscape Areas' in Dumfries and Galloway, and 'Sensitive Landscape Character Areas' in Ayrshire. However, guidance published by Scottish Natural Heritage and Historic Environment Scotland suggests the name be standardised to Special Landscape Area (SLA)

<sup>375</sup> UNESCO (2017) *Properties inscribed on the World Heritage List for Great Britain and Northern Ireland*. Available online at: <http://whc.unesco.org/en/statesparties/gb>

<sup>376</sup> Scottish Natural Heritage (2014) *Mapping Scotland's wildness and wild land*. Available online at: <http://www.snh.gov.uk/protecting-scotlands-nature/looking-after-landscapes/landscape-policy-and-guidance/wild-land/mapping/>

<sup>377</sup> Natural Resources Wales (2017) *National Landscape Character Areas (NLCA)*. Available online at: <https://naturalresources.wales/evidence-and-data/maps/nlca/?lang=en>

<sup>378</sup> Visit Wales (2017) *Areas of Outstanding Natural Beauty*. Available online at: <http://www.visitwales.com/explore/areas-of-outstanding-natural-beauty/natural-beauty>

## Landscape and Townscape

To recognise the value of Wales' historic landscapes, Cadw in partnership with the then Countryside Council for Wales (now called Natural Resources Wales) and the International Council on Monuments and Sites compiled a non-statutory Register of 58 landscapes of outstanding or special historic interest in Wales. It is a non-statutory, advisory register whose primary aim is to provide information and raise awareness of an initial selection of the most important and significant historic landscape areas in Wales in order to aid their protection and conservation<sup>379</sup>.

Further information on the landscape of Wales is documented within the LANDMAP dataset, which includes information with regards to:

- geological landscape;
- landscape habitats;
- visual and sensory;
- historic landscape; and
- cultural landscape.

LANDMAP maps and classifies landscapes and describes their key characteristics, qualities and components. It also identifies significant landscape change through monitoring of the baseline resource<sup>380</sup>.

There are three World Heritage Sites in Wales; Castles and Town Walls of King Edward in Gwynedd, Blaenavon Industrial Landscape and Pontcysyllte Aqueduct & Canal<sup>381</sup>. Cadw lists additional information with regards to coastal and maritime archaeology and historic battlefields including the inventory of historic battlefields<sup>382</sup>.

## 14.4 Summary of Existing Problems Relevant to the Water Resources NPS

The following existing problems for landscape have been identified:

- Over the last century, the following landscape character trends have been experienced in the UK<sup>383</sup>:
  - ▶ a gradual erosion of local distinctiveness in some areas, through a process of standardisation and simplification of some of the components that make up landscape character;
  - ▶ a loss of some natural and semi-natural features and habitats such as ancient woodlands and unimproved grassland;
  - ▶ a decline in some traditional agricultural landscape features such as farm ponds and hedgerows, and a loss of archaeological sites and traditional buildings;

<sup>379</sup> Cadw (2017) *The registered landscapes of outstanding and of special interest in Wales*. Available online at: <http://lle.gov.wales/catalogue/item/RegisteredLandscapesOfOutstandingHistoricInterestInWales/?lang=en>

<sup>380</sup> Natural resources Wales (2018) *LANDMAP – the Welsh landscape baseline*. Available online at: <https://naturalresources.wales/guidance-and-advice/business-sectors/planning-and-development/evidence-to-inform-development-planning/landmap-the-welsh-landscape-baseline/?lang=en>

<sup>381</sup> UNESCO (2017) *Properties inscribed on the World Heritage List for Great Britain and Northern Ireland*. Available online at: <http://whc.unesco.org/en/statesparties/gb>

<sup>382</sup> Cadw (2018) *Guidance*. Available online at: <http://cadw.gov.wales/historicenvironment/publications/?lang=en>

<sup>383</sup> Natural England (2008) *State of the Natural Environment 2008*. Available online at: <http://publications.naturalengland.org.uk/publication/31043>

## Landscape and Townscape

- ▶ increased urbanisation, often accompanied by poor design standards and a decline in the variety of building materials, and the importation of urban and suburban building styles into rural areas; and
- ▶ a loss of remoteness and reduced tranquillity because of built development and traffic growth.
- Light pollution appears to have increased considerably over the last 30-40 years over much of the UK. The growth of urban areas, road networks and industrial areas are all major contributors to increased light levels.
- The Scottish landscape is vulnerable to a variety of pressures. Key threats and opportunities to landscape character include the development of new infrastructure, agriculture, the loss and expansion of woodland and natural processes. Wind energy development is placing a pressure on landscape character, in particular in Southern Scotland where there are 83 windfarms installed or approved.

## 14.5 Likely Evolution of the Baseline

### England

There are a number of pressures and risks outlined in the ***State of the Natural Environment 2008*** Report that may affect the quality of landscapes in England. These include:

- Sea-level rise: Over the next few decades it is anticipated that there will be major sea incursions inland during storms, particularly on the south and east coasts of England. If measures such as managed retreat are not adopted in low-lying areas, there may be widespread losses of intertidal and coastal habitats. In the coastal zone, sea-level rise may also result in the direct loss of freshwater habitats such as reedbeds and wet grasslands;
- Fire: More droughts in the future will make the countryside increasingly vulnerable to wildfire, with potential for heathland, grassland, broadleaved woodlands and bogs to undergo major change in their structure;
- Grazing management: More summer droughts may mean that grazing is no longer possible in some open habitats such as fens, grasslands and heathlands due to die-back of vegetation and a lack of drinking water for animals. The spread of diseases (e.g. bluetongue) related to climate change may also reduce livestock numbers and restrict movement, altering grazing patterns and landscapes;
- Energy production: The production of biofuels in the countryside may result in changes to landscapes. Wind energy developments are likely to be more common; and
- Development pressure: Within rural England, the area of developed land has increased by about 4% since 1990. It is expected that the pace of development within England will increase in the future to make up for the current shortfall in housing provision. The effect of this increase pressure for development is likely to be felt most acutely in central and southern England where demand for housing is greatest.

Natural England report that in 2008, existing landscape character was being maintained in 51% of England's landscapes, whilst in a further 10%, existing character was being enhanced. However, 20% of landscapes were showing signs of neglect, while in the remaining 19% new landscape characteristics are emerging.

## Landscape and Townscape

Data from 1990 to 2003 indicates that in England, the number of Character Areas with patterns of change that either maintain or enhance character has increased from 36% to 61%. The number of Character Areas with evidence of neglect or erosion of character has decreased. This evidence suggests that the character of the majority of English landscapes, at Character Area scale, is being sustained.

The protected nature of National Park and AONB landscapes make it less likely that these landscapes will be affected by some of the risks outlined above (e.g. development pressure) although those protected landscapes nearest to existing urban areas are more likely to be at risk.

### Scotland

Between 1994 and 1999 Scottish Natural Heritage, in partnership with others, commissioned a series of LCA studies that together cover the whole of Scotland. The national suite of LCAs is now over 15 years old. Scottish Natural Heritage is reviewing Scotland's LCA studies, at character type level, to create a single dataset in an interactive digital version to be hosted on the new SNH website. It is understood that by late 2017 the revised LCAs will be available, providing further clarity on the long-term trends<sup>384</sup>.

### Wales

SoNaRR highlights that national landscape change to 2015 has been small overall, but some changes have been substantial locally. The key contributors to landscape change in the built environment include: the expansion of settlements, commercial and industrial developments, quarries and road improvements, onshore wind-farms, turbines and large recreational related developments. In the rural environment examples include: the felling of conifers and replanting with broadleaves, woodland expansion and changing bracken cover.

The changing climate will have an effect on Wales' distinctive landscapes and seascapes. Changes in weather patterns and soil conditions will alter the vegetation that is an important landscape feature. Climate change can also have an effect on flooding or increases in temperatures may also present challenges for the landscape. Coastal areas may be most at risk. Responses to changing climate such as the introduction of new crops and land uses will also have an impact on the visual appearance of the landscape.

## 14.6 Assessing Significance

The objectives and guide questions related to landscape which have been identified for use in the appraisal of the effects of the Water Resources NPS proposals and alternatives are set out in **Table 14.1**, together with reasons for their selection.

Table 14.1 Approach to Assessing the Effects of the Water Resources NPS Landscape and Townscape

Objective/Guide Question	Reasoning
<b>Objective: To protect and enhance landscape and townscape quality and visual amenity.</b>	<p>The SEA Directive (2001/42/EC) requires that the likely significant effects on landscape should be taken into account in the Environmental Report, which for the purposes of the AoS is incorporated within the AoS Report.</p> <p>The construction and operation of large scale water resources infrastructure can have adverse impacts on landscape character and visual amenity. Where works are located in areas of high landscape value (for example, National Parks), these effects could be significant. Water infrastructure can also contribute positively</p>

<sup>384</sup> Scottish Natural Heritage (2017) *Landscape Character Assessment*. Available online at: <http://www.snh.gov.uk/protecting-scotlands-nature/looking-after-landscapes/lca/>

## Landscape and Townscape

	to landscapes, introducing new features that can provide opportunities for nature and wildlife in the medium to long term. The inclusion of this AoS objective ensures that these effects can be considered within the AoS.
Will the Water Resources NPS have detrimental visual impacts?	Visual impacts can influence how people perceive a landscape or townscape and can decrease the character and intrinsic value.
Will the Water Resources NPS affect the purposes and/or special qualities of protected/designated/culturally important landscapes and their setting?	Areas designated for their landscape value are important at a national level and should be protected from adverse effects and enhanced where possible.
Will the Water Resources NPS affect the intrinsic character or setting of local landscapes, townscapes and seascapes?	Considering the protection and enhancement of landscape and townscape character is a requirement of the NPPF, SPP and PPW.
Will the Water Resources NPS help to minimise light pollution from construction and operational activities on residential amenity and on sensitive locations and receptors?	The consideration of light pollution is a requirement of the NPPF and PPW.
Will the Water Resources NPS affect public benefits and/or services provided by landscape?	There is an intrinsic link between the value of landscapes and their utility to the public.
Will the Water Resources NPS affect traditional land management activities that have created unique landscapes?	The construction and operation of water resources infrastructure can affect traditional patterns of working and living.
Will the Water Resources NPS provide opportunities to protect and enhance nationally and locally designated landscapes, townscapes and seascapes and their setting?	Areas designated for their landscape/townscape/waterscape value are should be protected from adverse effects and enhanced where possible.
Will the Water Resources NPS affect tranquillity?	The construction and operation of water resources infrastructure can affect tranquillity.
Will the Water Resources NPS affect public access to open spaces or the countryside?	National Parks and Access to the Countryside Act 1949 and Countryside and Rights of Way Act 2000 make provision for the recording, creation, maintenance and improvement of public paths and for securing access to open country and confers further powers for preserving and enhancing natural beauty.

**Table 14.2** sets out guidance that has been utilised during the assessment to help determine the relative significance of potential effects on the landscape objective.

**Table 14.2 Illustrative Guidance for the Assessment of Significance for Landscape and Townscape**

Effect	Description	Illustrative Guidance
++	Significant Positive	<ul style="list-style-type: none"> <li>Option would make a significant positive contribution to the purposes and/or special qualities of protected/designated landscapes and their setting;</li> <li>Option would have a significant positive effect on local landscapes and townscapes and/or their setting (e.g. through the replacement of poorly designed/derelict buildings with high quality development);</li> <li>Option would enhance public access to the countryside and increase open space provision.</li> </ul>
+	Positive	<ul style="list-style-type: none"> <li>Option would serve to enhance the purposes and/or special qualities of protected/designated landscapes setting;</li> <li>Option would have a positive effect on local landscapes and townscapes and/or their setting;</li> <li>Option would enhance public access to open spaces and the countryside.</li> </ul>

## Landscape and Townscape

Effect	Description	Illustrative Guidance
0	Neutral	<ul style="list-style-type: none"> <li>Option would not have any effect on statutorily-designated landscapes or their setting;</li> <li>Option would not have any effects on local landscapes and townscapes or their setting</li> <li>Option would not affect visual amenity;</li> <li>Option would not enhance or restrict public access to open spaces and the countryside.</li> </ul>
-	Negative	<ul style="list-style-type: none"> <li>Option would have short-term negative effects on the purposes and/or special qualities of protected/designated landscapes setting;</li> <li>Option would have a negative effect on the intrinsic character of local landscapes and townscapes and/or their setting;</li> <li>Option would affect the visual amenity of local communities;</li> <li>Option would temporally restrict public access to open spaces and the countryside.</li> </ul>
--	Significant Negative	<ul style="list-style-type: none"> <li>Option would have long-term negative effects on the purposes and/or special qualities of protected/designated landscapes setting;</li> <li>Option would severely affect the intrinsic character of local landscapes and townscapes and/or their setting;</li> <li>Option would severely affect the visual amenity of local communities;</li> <li>Option would result in the loss of open spaces and restrict public access to the countryside.</li> </ul>
?	Uncertain	<ul style="list-style-type: none"> <li>From the level of information available, the effect that the option would have on this objective is uncertain.</li> </ul>

## Appraisal of the Sustainability Effects of the Draft NPS and Reasonable Alternatives

**Table 14.3** presents the appraisal of the likely significant effects of the draft NPS and the 'no NPS' alternative on the landscape and townscape objective. The appraisal considers in-turn the three sub-sections used for each topic within Chapter 4 of the draft NPS: Applicant's Assessment; Decision Making and Mitigation. The performance of the draft NPS and the 'no NPS' alternative are scored accordingly, with a commentary provided in the Appraisal column. Commentary is also provided on Chapters 1 – 3 of the draft NPS outlining how the remainder of the NPS could affect the appraisal topic. The overall effect of the draft NPS and the 'no NPS' alternative is then summarised along with any proposed mitigation measures.

## Landscape and Townscape

Table 14.3 Appraisal of the Draft NPS and Reasonable Alternatives: Landscape and Townscape

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Applicant's Assessment</b>	+	+/?	<p><b>Draft NPS:</b> The text in the draft NPS under 'Applicant's Assessment' states:</p> <p>4.9.3 "The applicant should undertake an assessment of any likely significant landscape and visual impacts and describe these in the Environmental Statement. A guide has been produced to assist in addressing landscape issues. The landscape and visual assessment should include reference to any landscape character assessment and associated studies as a means of assessing landscape impacts relevant to the proposed development. In addition, the applicant's assessment should take account of any relevant policies based on these assessments in local development documents."</p> <p>4.9.5 "The assessment should include the visibility and conspicuousness of the development during construction and the presence and operation of the development and potential impacts on views and visual amenity. This should include any noise and light pollution effects, including on local amenity, tranquillity and nature conservation."</p> <p>4.9.7 "Where necessary, applicants will need to demonstrate how they have fulfilled the requirements set out in Defra's 'English National Parks and the Broads: UK government vision and circular 2010' or successor documents. These requirements should also be complied with where infrastructure projects impact on Areas of Outstanding Natural Beauty."</p> <p>The text outlined above provides clear guidance, and reference to more detailed external guidance, on how landscape and visual impacts should be taken into account and assessed by applicants. Overall, this has been assessed as having a positive effect on this AoS objective.</p> <p><u>Recommendations for improvement</u></p> <p>This section could make direct reference to the Planning Practice Guidance (PPG) on how landscape matters should be dealt with as part of a development consent order application (PPG Natural Environment – Landscape). Additionally, this section could encourage early consultation and engagement with relevant stakeholders including, for example, Natural England, the relevant local planning authority, National Park authorities and AONB partnerships.</p> <p>This section could include reference to the enhancement of landscape character and visual amenity and encourage applicants to consider impacts on traditional land management activities that have created unique landscapes.</p> <p>Inclusion of specific guidance on the likely contents of an Environmental Statement (ES) would be helpful in clarifying the expectations for the applicant's assessment. Specification of the contents of the ES could be drawn from the following, which in turn serves as the reference point for the detail of the 'Decision Making' section:</p>

## Landscape and Townscape

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<ul style="list-style-type: none"> <li>Scoping <ul style="list-style-type: none"> <li>Establish the baseline landscape (including, where relevant, seascape) context and character, including the applicable national and local landscape character areas.</li> <li>Establish the character of the development site including site topography and other key landscape features including, for example, public rights of way, hedgerows, trees and site use.</li> <li>Identify potentially sensitive visual receptors (e.g. through the use of Zones of Theoretical Visibility (ZTV).</li> <li>Identify the criteria for determining the sensitivity of different landscape and visual receptors to change and for assessing the significance of effects.</li> </ul> </li> <li>Impact assessment <ul style="list-style-type: none"> <li>Undertake an assessment of landscape (and, where relevant, seascape) impacts that considers the effects of change and development on landscape as a resource in accordance with the Guidelines for Landscape and Visual Impact Assessment (2013)<sup>385</sup>.</li> <li>Undertake an assessment of visual effects that assesses the effects of change and development on the views available to people and their visual amenity.</li> <li>Detail conclusions on the significance of any effects that are predicted upon landscape features and character or on visual amenity.</li> </ul> </li> <li>Avoidance, mitigation, compensation and enhancement <ul style="list-style-type: none"> <li>Identify and incorporate measures to avoid, reduce and compensate for landscape impacts, and where possible enhance beneficial effects.</li> <li>Detail proposals for monitoring impacts of the development and evaluation of the success of proposed mitigation, compensation and enhancement measures.</li> </ul> </li> </ul>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy, specific statutory requirements concerning effects on nationally designated landscape (Section 11A of the National Parks and Access to</p>

<sup>385</sup> Landscape Institute (2013) *Guidelines for Landscape and Visual Impact Assessment 3*. Available at: <https://www.landscapeinstitute.org/technical/gvia3-panel/>



## Landscape and Townscape

Draft NPS Section	Draft NPS	No NPS	Appraisal
			Countryside Act 1949 and Section 85 of the Countryside and Rights of Way Act 2000) and the EIA Regulations. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on landscape and townscape. In consequence, effects would still be considered likely to be positive. However, the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level, hence uncertainty over the likely effect.
<b>Decision Making</b>	<b>+</b>	<b>+/?</b>	<p><b>Draft NPS:</b> This section emphasises the importance of understanding the sensitivity of the receiving environment and promotes careful design to mitigate impacts on landscape character.</p> <p>In accordance with the NPPF, the text states that great weight should be given to conserving landscape and scenic beauty in nationally designated areas, in particular National Parks, the Broads and AONBs which have the highest level of environmental protection; the draft NPS states that <i>"the Secretary of State should refuse development consent in these areas except in exceptional circumstances and where it can be demonstrated that the development is in the public interest"</i>. Further, this section sets out that, where consent is given in these areas, the Secretary of State <i>"should be satisfied that the applicant has ensured that the development will be carried out to high environmental standards and, where possible, includes measures to enhance other aspects of the environment. Where necessary, the Secretary of State should consider the imposition of appropriate requirements to ensure these standards are delivered"</i>.</p> <p>The section also promotes the conservation of local landscapes and townscapes, taking into account relevant development plan policies.</p> <p>With regard to visual impacts (including in respect of coastal areas), the text in this section requires the Secretary of State to judge whether the visual effects on sensitive receptors, such as local residents, and other receptors including visitors to the local area, outweigh the benefits of a development.</p> <p>Overall, it is considered that the draft NPS is likely to make a positive contribution to this AoS objective.</p> <p><u>Recommendations for improvement</u></p> <p>None identified.</p> <p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy, specific statutory requirements concerning effects on nationally designated landscape (Section 11A of the National Parks and Access to Countryside Act 1949 and Section 85 of the Countryside and Rights of Way Act 2000) and the EIA Regulations. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on</p>

## Landscape and Townscape

Draft NPS Section	Draft NPS	No NPS	Appraisal
			landscapes and townscapes. In consequence, effects would still be considered likely to be positive. However, the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level, hence uncertainty over the likely effect.
<b>Mitigation</b>	<b>+</b>	<b>+/?</b>	<p><b>Draft NPS:</b> This section identifies the broad considerations for mitigation associated with new water resources infrastructure, including in respect of siting, design and landscaping. It states:</p> <p>4.9.16 <i>"Reducing the scale of a project or making changes to its operation can help to avoid or mitigate the visual and landscape effects of a proposed project. However, reducing the scale or otherwise amending the design or changing the operation of a proposed development may result in a significant operational constraint and reduction in function. There may be exceptional circumstances where mitigation could have a very significant benefit and warrant a small reduction in scale or function. In these circumstances, the Secretary of State may decide that the benefits of the mitigation to reduce the landscape effects outweigh the marginal loss of scale or function."</i></p> <p>4.9.17 <i>"Adverse landscape and visual effects may be minimised through appropriate siting of infrastructure, design (including choice of materials), and landscaping schemes, depending on the size and type of proposed project. Materials and designs for infrastructure should always be given careful consideration."</i></p> <p>4.9.18 <i>"Depending on the scale of the project, topography of the surrounding terrain and areas of population it may be appropriate to undertake landscaping off site, although if such landscaping was proposed to be consented by the development consent order, it would have to be included within the order limits for that application. For example, filling in gaps in existing tree and hedge lines may help to mitigate the impact when viewed from a more distant vista."</i></p> <p>More specific mitigation measures are provided in the 'Introduction' section.</p> <p>Overall, it is considered that the draft NPS makes a positive contribution to this AoS objective.</p> <p><u>Recommendations for Improvement</u></p> <p>To inform the appraisal of this section of the draft NPS, a high level review of the potential construction and operational impacts of nationally significant water resources infrastructure covered by the draft NPS on landscape and townscape has been undertaken. This review is intended to help identify where any additional measures could be included in the draft NPS (in the introduction or mitigation section of the topic) to mitigate the potential adverse impacts of nationally significant water resources infrastructure and maximise benefits.</p>

## Landscape and Townscape

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>The following text identifies the anticipated landscape and visual impacts and associated mitigation measures. These have been largely identified within the draft NPS and are discussed again here to ensure that the description of impacts is clear and provides the necessary context for the recommended mitigation measures. Where impacts discussed here have not been included within the draft NPS, they have been clearly identified.</p> <p><b>Reservoirs (including new reservoirs and reservoir enlargement/raising)</b></p> <p><i>Construction</i></p> <p>As identified in the draft NPS, the scale of works involved in constructing a new or enlarged reservoir (including groundworks, embankments and land re-profiling) will be significant. The reservoir will almost certainly be sited on greenfield land with the potential for existing landscape features (e.g. hedgerows or trees) to be lost as a consequence of the works. As a result, there is the potential for construction activity to have detrimental impacts on landscape/townscape character; where development takes place in designated landscapes in particular, these impacts could be significant.</p> <p>In addition to the effects identified in the draft NPS, construction activity associated with new reservoirs in particular could affect traditional land management activities such as agriculture which may indirectly affect landscape management.</p> <p>Depending on the location of development, construction activity could affect the visual amenity of nearby sensitive receptors such as recreational receptors (including users of existing reservoirs) and residential properties. There is also the potential for light pollution (should construction activity take place during winter months) and adverse impacts on tranquillity (due to noise and vibration effects).</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, whilst reservoirs can become attractive landscape features in their own right, the development of new reservoirs in particular will result in a permanent land-use change and altered landscape profile. Due to the scale of development, there is a strong potential for such infrastructure to affect landscape character and the visual amenity of nearby receptors; where development takes place in designated landscapes in particular, these impacts could be significant.</p> <p>In addition to the effects identified in the draft NPS, the enlargement of existing reservoirs could permanently affect local landscape character and visual amenity.</p> <p><b>Water Transfer Schemes</b></p> <p><i>Construction</i></p>

## Landscape and Townscape

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>As identified in the draft NPS, water transfer schemes may require long distance pipeline routing with significant groundworks and above ground infrastructure. There is a potential for the construction works to have detrimental impacts on landscape quality, particularly where development affects designated landscapes, as well as townscape.</p> <p>In addition to the effects identified in the draft NPS, depending on the location of development, construction activity could affect the visual amenity of nearby receptors. There is also the potential for light pollution, should construction activity take place during winter months, and effects on tranquillity.</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, once operational, it is likely that pipelines will be buried such that associated impacts are likely to be negligible. However, any above ground infrastructure such as pumping stations and water treatment works may continue to have adverse impacts on landscape character and visual amenity; where development takes place in designated landscapes in particular, these impacts could be significant.</p> <p><b>Desalination</b></p> <p><i>Construction</i></p> <p>As identified in the draft NPS, due to the coastal location of desalination plants, there is the potential for development to affect seascapes.</p> <p>In addition to the effects identified in the draft NPS, works associated with the construction of a desalination plant would be large in scale with a significant amount of above ground infrastructure. There is also a potential for associated groundworks to be significant including the provision of long distance routing. In consequence, construction activity may have detrimental impacts on landscape/townscape character; where development takes place in designated landscapes in particular, these impacts could be significant.</p> <p>Depending on the location of development, construction activity could affect the visual amenity of nearby receptors. There is also the potential for light pollution (should construction activity take place during winter months) and impacts on tranquillity.</p> <p><i>Operation</i></p> <p>As identified in the draft NPS, once plants are operational, there is potential for the above ground infrastructure to impact on visual amenity and the local and wider landscape/townscape/seascape setting; where development takes place in designated landscapes in particular, these impacts could be significant.</p>

## Landscape and Townscape

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p>In addition to the effects identified in the draft NPS, there is also the potential for light pollution and impacts on tranquillity during operation.</p> <p><b>Potential additional mitigation measures identified through a review draft WRMPs and their associated SEA Environmental Reports include:</b></p> <ul style="list-style-type: none"> <li>Siting should be considered to avoid designated landscapes where possible.</li> </ul>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy, specific statutory requirements concerning effects on nationally designated landscape (Section 11A of the National Parks and Access to Countryside Act 1949 and Section 85 of the Countryside and Rights of Way Act 2000) and the EIA Regulations. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on landscape and townscape. In consequence, effects would still be considered likely to be positive. However, the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level, hence uncertainty over the likely effect.</p>
<b>Other Sections of the Draft NPS Relevant to Landscape and Townscape</b>	<p>The following provides additional commentary on the text in the other sections of the draft NPS relevant to landscape and townscape. The numbering and references are taken from the relevant sections and paragraphs of the draft NPS.</p> <p><b><u>1. Introduction</u></b></p> <p><b>1.1. Background and scope of this NPS</b> – reference to the AoS prepared in support of the draft NPS will help to ensure that the effects on landscape and townscape are given proper consideration, notwithstanding the fact that there remains uncertainty over potential impacts, particularly in respect of the absence of specific locations.</p> <p>1.1.6 With regard to para 1.1.8, there is an opportunity for the consideration of effects on landscape and townscape in a specific locality through the preparation of a local impact report submitted by a local authority in accordance with the Planning Act 2008. There is no prescribed format for local impact reports but there is clearly an opportunity for a local authority to comment on relevant issues, helping to ensure that consideration is given to likely effects in a particular locality.</p> <p><b>1.2. Geographical coverage</b> – reference to cross border impacts in this section will help to ensure that due consideration is given to the impacts of water resources infrastructure on landscapes and townscapes in Scotland and Wales.</p>		

## Landscape and Townscape

Draft NPS Section	Draft NPS	No NPS	Appraisal
			<p><b>1.3. Infrastructure covered by the Water Resources NPS</b> – as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on landscape and townscape.</p> <p><b><u>2. Government policy and the need for water resources infrastructure</u></b></p> <p><b>2.2. Pressure on water availability now and in the future</b> – this section makes specific reference to protecting and enhancing the environment as a key driver of the need for nationally significant water resources infrastructure’.</p> <p><b>2.5. The role of water resource management plans in identifying the need</b> – as noted, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on landscapes and townscapes. This is reflected in paragraph 2.5.7.</p> <p><b>2.6 The role of nationally significant infrastructure projects</b> – the section identifies that alongside reservoirs, water transfers and desalination, there is the potential for water infrastructure, such as large scale effluent reuse, to qualify as an NSIP, when assessed against the relevant threshold in the Planning Act 2008 or through a section 35 referral. These infrastructure types may have landscape and townscape impacts of a different nature to the three identified infrastructure types. Therefore, there is a need for the range of generic impacts included in the NPS to be applicable to these additional infrastructure types that could be brought forward.</p> <p>Overall, it is currently considered that the range of generic impacts provides an adequate and flexible basis for the consideration of other types of water resources infrastructure that may come forward as an NSIP.</p> <p><b><u>3. Assessment Principles</u></b></p> <p><b>3.1 General principles of assessment</b> - the provisions of the Planning Act 2008 and the policies and protections set out in the draft NPS provide for a balanced consideration of needs. The requirement for the identification of adverse impacts (including longer-term and cumulative adverse impacts) along with measures to avoid, reduce or compensate these, provides the starting point for the protection and enhancement of landscapes and townscapes.</p> <p>This section outlines the WRMP process. As highlighted above, as part of the options identification and appraisal process (including SEA) undertaken in support of WRMPs, early consideration will be given to the impacts of options on landscapes and townscapes.</p> <p><b>3.2 Environmental Impact Assessment</b> – the consideration of proposals within the EIA Regulations and the preparation of an ES (where required) agreed by statutory agencies and specifying mitigation and enhancement measures will ensure that effects on landscapes and townscapes are fully considered, as will the consideration of cumulative effects and interrelationships between effects.</p> <p>This section specifically highlights that information gathered from the WRMP options assessments and the draft NPS will also be useful to identify the significant effects of a proposed project.</p>

## Landscape and Townscape

Draft NPS Section	Draft NPS	No NPS	Appraisal
	<p><b>3.5 Assessing Alternatives</b> – the requirement that reasonable alternatives will need to be considered as part of scheme design and project planning, including as part of the WRMP options appraisal process, should ensure that landscape and townscape issues are taken into account, both in terms of protection and opportunities for mitigation and enhancement.</p> <p><b>3.6 Criteria for ‘good design’ for water resources infrastructure</b> – attention to good design principles will be of benefit to landscape interests through the consideration of how new infrastructure interacts with its context. The decision making requirements include the need to take into account aesthetics, including a scheme’s contribution to the quality of the area in which it would be located. In this context, this section of the draft NPS states: <i>“There may be opportunities for the applicant to demonstrate good design in terms of site layout and design measures relative to existing landscape and historical character and function, landscape permeability, landform and vegetation whilst integrating biodiversity and nature conservation interests”</i>.</p> <p><b>3.7 Climate Change Adaptation</b> – adaptation measures could be required which impinge upon landscape interests, although with appropriate design and mitigation, these could be of mutual benefit (for example in relation to landscape enhancement).</p>		
Summary Appraisal of Likely Significant Effects	+	+/?	<p><b>Draft NPS:</b> The construction and operation of nationally significant water resources infrastructure would be likely to have adverse impacts on landscape and townscape. The potential magnitude of effects will vary depending on the exact type, scale and location of development; where proposals are located in designated landscapes such as National Parks and AONBs and include above ground infrastructure, there is the potential for impacts to be significant.</p> <p>In this context, the implementation of the draft NPS is likely to result in positive effects in respect of the protection and enhancement of landscapes and townscapes; this reflects the specification of parameters associated with the construction and operation of new water resources infrastructure and identified opportunities for mitigation and enhancement. The wider considerations of the draft NPS in respect of the assessment principles such as good design is likely to result in positive effects for landscape interests. It should be noted, however, that the draft NPS framework will be applied in light of existing legislation and this will be a balancing exercise reflecting the consideration of national need and other considerations.</p>
			<p><b>No NPS:</b> Under this alternative, applications would be subject to the provisions of national planning policy, specific statutory requirements concerning effects on nationally designated landscape (Section 11A of the National Parks and Access to Countryside Act 1949 and Section 85 of the Countryside and Rights of Way Act 2000) and the EIA Regulations. Further, proposals would continue to be identified through the WRMP process which would include the consideration of effects on landscape and townscape. In consequence, effects would still be considered likely to be positive. However, the absence of a clear statement of the full range of considerations to be taken into account (as proposed in the draft NPS) risks inconsistency in interpretation, particularly at a project level, hence uncertainty over the likely effect.</p>

## Landscape and Townscape

Draft NPS Section	Draft NPS	No NPS	Appraisal
<b>Summary of Recommended Mitigation and Enhancement</b>	<p>Overall, it is considered that the draft NPS makes a positive contribution to the landscape and townscape AoS objective. However, section 4.9 of the draft NPS could be enhanced through, in particular:</p> <ul style="list-style-type: none"> <li>strengthening of linkages to the PPG;</li> <li>inclusion of a reference to the enhancement of landscape character and visual amenity;</li> <li>encouraging applicants to consider impacts on traditional land management activities that have created unique landscapes;</li> <li>highlighting the importance of ongoing engagement with relevant stakeholders;</li> <li>provision of further guidance on the possible contents of an ES.</li> </ul> <p>Additional project-level mitigation for inclusion in the draft NPS is suggested based on a review of draft WRMPs and their associated SEA Environmental Reports. This includes:</p> <ul style="list-style-type: none"> <li>Siting should be considered to avoid designated landscapes where possible.</li> </ul>		



**wood.**

