March 2025

Strategic Environmental Assessment (SEA) for the Strategic Spatial Energy Plan

SEA Scoping Report

NESO
National Energy System Operator

Revision history

Revision	Revision date	Details	Authorised by	
Version 1.0	24/12/2024	Initial draft for NESO comment	Nick Chisholm-Batten	Technical Director
Version 2.0	03/02/2025	Updated draft based on NESO's review	Nick Chisholm-Batten	Technical Director
Version 3.0	25/02/2025	Final draft for client comment	Nick Chisholm-Batten	Technical Director
Version 4.0	11/03/2025	Consultation version	Joe Underhill	Senior Environmental and Consenting Specialist

Contents

Glossary

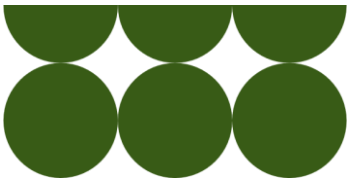
Term	Description
Agricultural Land Classification (ALC)	In England, classifies agricultural land in five categories according to versatility and suitability for growing crops. The top three grades, Grade 1, 2 and 3a, are referred to as 'Best and Most Versatile' (BMV) land.
Air Quality Management Area (AQMA)	Areas declared due to exceedances of national air quality objectives. For declared AQMAs, the Local Authority is required to prepare a Local Air Quality Action Plan.
Ancient woodland	An area that has been wooded continuously since at least 1600 AD. It includes ancient semi-natural woodland mainly made up of trees and shrubs native to the site, usually arising from natural regeneration; and plantations on ancient woodland sites - replanted with conifer or broadleaved trees that retain ancient woodland features, such as undisturbed soil, ground flora and fungi.
Best and Most Versatile (BMV) agricultural land	This is agricultural land graded 1 to 3a (see ALC description above).
Biodiversity Action Plan (BAP) Priority Habitat	Habitats that have been identified as being the most threatened and requiring conservation action under the UK BAP. They cover a wide range of semi-natural habitat types.
Conservation area	Areas designated at the local level to protect the special architectural and historic interest of an area through protecting the features that make it unique and distinctive.
Flood Risk Area (FRA)	In England, these are areas where there is the potential for significant risk of impacts should major flooding occur. It is recognised that there are areas at risk of flooding outside of these areas.
Gardens and Designed Landscapes	In Scotland, Gardens and Designed Landscapes are selected by Historic Environment Scotland for the Inventory under the terms of the Ancient Monuments and Archaeological Areas Act 1979.
Green infrastructure networks	Green infrastructure is a network of multi-functional green and blue spaces and other natural features, urban and rural, which can deliver a wide range of environmental, economic, health and wellbeing benefits for nature, climate, local and wider communities and prosperity.
Gross Value Added (GVA)	The value generated by any unit engaged in the production of goods and services.

Term	Description
Highly Protected Marine Area (HPMA)	Areas of the sea (including the shoreline) in England that allow the protection and full recovery of marine ecosystems. By setting aside some areas of sea with high levels of protection, HPMAs will allow nature to fully recover to a more natural state, allowing the ecosystem to thrive.
Historic Marine Protected Area (Historic MPA)	In Scotland, Historic MPAs aim to preserve marine historic assets of national importance. They were introduced in the Marine (Scotland) Act 2010 and may be designated in Scottish territorial waters (up to 12 nautical miles).
Index of Multiple Deprivation (IMD)	A comprehensive measure that assesses the relative levels of deprivation in small areas or neighbourhoods across the country. The IMD considers a range of factors, including income, employment, health, education, crime, housing, and environment, to compile a single score that reflects the overall state of deprivation. This index is widely used to identify areas that require additional support and resources, and to inform policy decisions aimed at reducing inequality and improving the quality of life for residents.
Listed building	A building of special architectural or historic interest listed by the Secretary of State for Culture, Media and Sport on the advice of Historic England (England); Historic Environment Scotland (Scotland); or Welsh Ministers (Wales). Buildings are graded to indicate their relative importance. They include: • Grade I: A listed building of exceptional interest. • Grade II*: Particularly significant buildings of more than local interest. • Grade II: Buildings of special architectural or historic interest.
Marine Conservation Zone (MCZ)	In England, these are areas that protect a range of nationally important, rare or threatened habitats and species. They are designated by Defra under section 116(1) of the Marine and Coastal Access Act 2009 (MCAA). There are 91 MCZs in waters around England. In Wales, MCZs are a way of conserving marine habitats and wildlife and other features, of special importance, along the short or on the seabed.

Term	Description
Marine Protected Area (MPA)	In England, areas of the ocean established to protect habitats, species and processes essential for healthy, functioning marine ecosystems. The purpose of an MPA is to protect and recover rare threatened and important marine ecosystems, habitats and species from damage caused by human activities. In Scotland, MPAs are designed to protect Scotland's seas, marine life and habitats from damage caused by human activities.
National Character Area (NCA)	Distinct natural areas in the landscape of England, each with their own unique combination of physical and environmental characteristics such as geology, landform, soils, vegetation, climate, wildlife, land use, and human activity. They also have their own local cultural and economic distinctiveness. The boundaries of NCAs do not stop at county or district boundaries but are based on natural geography. There are 159 NCAs and they form the context for various environmental and land management decisions.
National Landscape	An area of high scenic quality which has statutory protection in order to conserve and enhance the natural beauty of its landscape. They are designated solely for their landscape qualities, for the purpose of conserving and enhancing their natural beauty (which includes landform and geology, plants and animals, landscape features and the history of human settlement over the centuries).
National Park	There are 15 National Parks in Great Britain – ten in England, three in Wales, and two in Scotland – and each one has been designated as a protected landscape because of its special qualities.
National scale land capability for agriculture	In Scotland, this provides information on the types of crops that may be grown in different areas dependent on environmental and soil characteristics. Classes 1, 2 and 3.1 are known as prime agricultural land.
National Scenic Area (NSA)	Scottish legislation defines an NSA as an area "of outstanding scenic value in a national context". The designation's purpose is both to identify Scotland's finest scenery and to ensure its protection from inappropriate development. Scotland's 40 NSAs cover 13% of the land.
Nitrate Vulnerable Zone (NVZ)	Areas designated as being at risk from agricultural nitrate pollution. DEFRA reviews NVZs every 4 years to account for changes in nitrate concentrations.

Term	Description
Potentially Vulnerable Area (PVA)	In Scotland, these are areas where significant flood risk exists now or is likely to occur in the future. They are updated and published every six years.
Protected wreck	In England and Wales, the Protection of Wrecks Act 1973 allows the Secretary of State to designate a restricted area around a wreck to prevent uncontrolled interference. These protected areas are likely to contain the remains of a vessel, or its contents, which are of historical, artistic or archaeological importance.
Registered Historic Park and Garden	In Wales, registration identifies parks and gardens which are of special historic interest to Wales. Registrations recognises all the special qualities of these parks and gardens and protects them for the benefit of future generations. They are recognised by law through the Historic Environment (Wales) Act 2023.
Registered Park and Garden	In England, the Historic England 'Register of Historic Parks and Gardens of special historic interest in England' identifies over 1,600 sites assessed to be of national importance. In this context, Registered Parks and Gardens are those deemed to be of particular historic importance.
Scheduled monument	A historic building or site that is included in the Schedule of Monuments kept by the Secretary of State for Culture, Media and Sport. The regime is set out in the Ancient Monuments and Archaeological Areas Act 1979.
Site of Special Scientific Interest (SSSI)	Areas considered to best represent the UK's natural heritage, such as through the site's diversity of plants, animals and habitats, rocks and landforms, or through combinations of such natural features. Nationally designated, SSSIs are deemed to be the UK's best wildlife and geological sites.
Source Protection Zone (SPZ)	Zones which show the level of risk to groundwater sources from contamination. This could be from any activity that might cause pollution in the area. The closer the activity, the greater the risk. There are three main zones: inner (SPZ1), outer (SPZ2), and total catchment (SPZ3).
Special Area of Conservation (SAC)	Protected sites designated under the European Commission Habitats Directive. Article 3 of the Habitats Directive requires the establishment of a European network of important high-quality conservation sites that will make a significant contribution to conserving the 189 habitat types and 788 species identified in Annexes I and II of the Directive (as amended). Sites proposed for selection are proposed by the statutory nature conservation agencies, co-ordinated through JNCC.

Term	Description
Special Protection Area (SPA)	Protected areas for birds classified under the Conservation of Habitats and Species Regulations 2017 (as amended) in England and Wales (including the adjacent territorial sea). SPAs, together with SACs, form the UK's national site network.
Strategic Environmental Assessment (SEA)	A systematic process undertaken to evaluate the likely significant environmental effects of proposed plans and programmes. It is a mechanism for considering and communicating the likely effects of a draft plan and reasonable alternatives in terms of environmental issues, with a view to ensuring that the plan – once finalised – is sound and reflects sustainable development ambitions. In this respect, SEA is a tool to help inform stakeholders and decision makers of the potential significant environmental effects of the decisions being made during development of a plan.
World Heritage Site (WHS)	A landmark or area with legal protection by an international convention administered by the United Nations Educational, Scientific and Cultural Organization (UNESCO). WHSs are designated by UNESCO for having cultural, historical, scientific or other form of significance. The sites are judged to contain "cultural and natural heritage around the world considered to be of outstanding value to humanity".



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Executive Summary

Overview of NESO

The UK's 2023 Energy Act set the legislative framework for an independent system planner and operator to help accelerate Great Britain's (GB) energy transition, leading to the establishment of the National Energy System Operator (NESO).

An independent, public corporation at the centre of the energy system, NESO takes a whole system view to create a world where everyone has access to reliable, clean and affordable energy. NESO's work will be the catalyst for change across the global community, forging the path to a sustainable future for everyone.

Tackling climate change is truly the challenge of our generation; addressing energy security, sustainability and affordability for everyone is at the forefront of the global agenda and drive to meet net zero. It is NESO's job to transform the whole energy system to meet these challenges and transition to a low-carbon future, embracing new technologies and cleaner generation sources, always with the cost to the consumer in mind.

NESO's three primary duties are:

- Net zero – enabling the government to deliver on its legally binding emissions targets
- Efficiency and economy – promoting efficient, coordinated, and economic electricity and gas networks
- Security of supply – ensuring security of supply for current and future consumers of electricity and gas.

Overview of the Strategic Spatial Energy Plan

The concept of a Strategic Spatial Energy Plan (SSEP) for GB was introduced in August 2023, with the publication of a government-commissioned report on how GB can accelerate the deployment of its electricity transmission infrastructure. The report, produced by the UK's Electricity Network Commissioner, recommended the creation of an SSEP for GB.

The commissioner's report was followed in November 2023 by the UK government's Transmission Acceleration Action Plan, which set out a holistic approach to delivering the recommendations. In October 2024, the UK, Scottish and Welsh governments officially commissioned NESO to produce the SSEP.

The SSEP is part of a wider transition towards more strategic energy planning initiatives. It will forecast for the first-time energy supply and demand characteristics and their likely whereabouts. The first of its kind in GB, the SSEP is a critical step in accelerating and optimising GB's energy transition.

The first SSEP will be a GB-wide plan mapping potential locations, quantities and types of electricity and hydrogen generation and storage infrastructure over time, modelled across a range of plausible futures. Future versions of the SSEP may have a broader scope.

This first SSEP will achieve the following goals:

- Provide a pathway for electricity and hydrogen supply types, locations, capacities and timings. This will be optimised for cost across demand and high-level network needs, as well as environmental, community and other spatial interests, to support the energy transition efficiently and securely.
- Provide UK, Scottish and Welsh governments and Ofgem with a plan they can endorse. This will:
    - inform government policy and any developments that may be deemed beneficial in legal frameworks in England, Scotland and Wales.
    - enable specific network solutions to be developed and agreed through the Centralised Strategic Network Plan (CSNP).
- Firmly set the context for the nation's energy requirements, which will increase certainty and confidence for industry and investors through having a plan in which community voices and interdependencies are considered in advance.

The Strategic Environmental Assessment for the SSEP

NESO has commissioned AECOM to undertake an independent and objective Strategic Environmental Assessment (SEA). This Scoping Report has therefore been prepared by AECOM on behalf of NESO for the SSEP.

An SEA is being undertaken to inform the development of the SSEP. SEA is undertaken for certain plans and programmes which have the potential to lead to significant environmental effects.

In summary, SEA is:

- a systematic process for evaluating the environmental consequences of a proposed plan.
- a process which seeks to ensure that environmental issues are fully integrated and addressed at the earliest appropriate stage of decision making with a view to promoting sustainable development.
- undertaken with the aim of informing and influencing the plan-making process with a view to avoiding or mitigating significant negative effects and maximising positive effects.

The SEA for the SSEP follows the process required by English and Welsh SEA Regulations and the Scottish Environmental Assessment Act. The stages of the SEA are represented in Figure 1.2 in the main body of the Scoping Report.

This Scoping Report

This SEA Scoping Report presents the main output of the scoping stage of the SEA (Stage 1 above). It identifies the environmental baseline and key issues to be considered through the SEA and presents a framework against which the SSEP proposals can be assessed.

The scoping information has been presented through eight SEA themes:

- Air quality
- Climate change
- Community wellbeing
- Cultural heritage and historic environment
- Ecology and biodiversity
- Land and soil resources
- Landscape and seascape
- Water

This information has also been presented spatially through a series of terrestrial and marine spatial zones.

This Scoping Report is presented through the following sections:

- Chapter 3 and Appendix A: Present a summary of the objectives of the key policies, plans and programmes that are relevant for the SEA.
- Chapter 4: Sets out how the proposed baseline information and key issues for the SEA is presented.
- Chapters 5-26: Present the baseline information and key issues by spatial zone.
- Chapter 27: Presents the proposed SEA framework, which sets out a series of objectives and assessment questions against which the draft SSEP and reasonable alternatives will be assessed.
- Chapter 28: Presents the next steps for the SEA process.

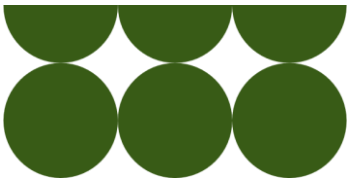
Consultation on the Scoping Report

The consultation on this Scoping Report will be undertaken for a period of seven weeks from 12th March 2025 to 30th April 2025.

At this scoping stage, the SEA Regulations and Act require consultation with the SEA consultation bodies, but do not require full public consultation.

This Scoping Report will be issued to the SEA consultation bodies for England, Scotland and Wales, as well as Northern Ireland and the Republic of Ireland – in account of transboundary effects. In addition, the Scoping Report will be issued to the other relevant organisations identified by NESO, including those in the Environmental Working Group currently advising the development of the SSEP.

Consultees are invited to comment on the content of this Scoping Report, in particular the baseline information for the SEA, the identified key issues and the proposed SEA framework.



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1. Introduction

Purpose of this report

The SSEP

SEA process for the SSEP

1.1. Purpose of this Scoping Report

To support the delivery of the emerging SSEP, and in line with the UK, Scottish and Welsh governments' commission[1] to NESO, a Strategic Environmental Assessment (SEA) is being undertaken. AECOM, working on behalf of NESO, has been instructed to undertake the SEA for the SSEP.

This document comprises the Scoping Report for the SEA. The Scoping Report aims to identify the key issues and outline the approach for the SEA of the SSEP, including the assessment framework that will be used to evaluate the plan. This will form the basis for the assessments to be subsequently undertaken through the SEA process.

1.2. The SSEP

The UK Government is on a mission to speed up decarbonisation and action towards clean energy; a mission that is supported by the Scottish and Welsh governments. This will involve significantly increasing the amount of low carbon electricity generation in the system, as well as new technologies like hydrogen, while building the associated infrastructure that will enable the system to function. It also has the potential to boost energy independence, protect consumers, and support jobs across the country.

In response to this, the UK, Scottish and Welsh governments have jointly commissioned NESO to create an SSEP for the energy system on land and sea across GB to support acceleration of a secure energy system to contribute to the UK achieving net zero carbon emissions by 2050. The first SSEP will be a GB-wide plan mapping potential locations, quantities and types of electricity and hydrogen generation and storage infrastructure over time, modelled across a range of plausible futures. It will also provide advice on how new energy projects should be distributed across GB in a way that will reduce the costs in transporting power to homes and businesses, which could in turn bring down bills for consumers. In the future, the SSEP will be updated regularly and could include other types of energy, like natural gas.

Notably, NESO will develop several **'pathway options'** – different options for how the energy system could look in the future – and present them to the UK Energy Secretary, following consultation with SSEP governance groups, including the Scottish and Welsh governments. The UK Energy Secretary will then take the final decision on which pathway should be taken forward for the SEA and HRA and for public and stakeholder consultation.

The SSEP will be used to help plan the future of the energy system. It will sit alongside and grow with future government policy and market-led interventions; it is intended to be complementary to these, providing a more strategic approach to spatial planning, and become part of the framework of planning systems across GB. The SSEP's outputs will directly feed into, and be published in time for, the Centralised Strategic Network Plan (CSNP): a plan for transmission network infrastructure, which NESO is also developing.[2]

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[1] Department for Energy Security and Net Zero (October 2024) Strategic Spatial Energy Plan Commission to the National Energy System Operator

[2] NESO (no date): Network Planning Review (NPR)

Future versions of the SSEP may be informed by developments in other areas of strategic energy planning at NESO, such as the CSNP and Regional Energy Strategic Plans (RESPs).

The SSEP will cover the terrestrial and marine areas of GB. The extent of the plan area is presented in Figure 1.1. below.

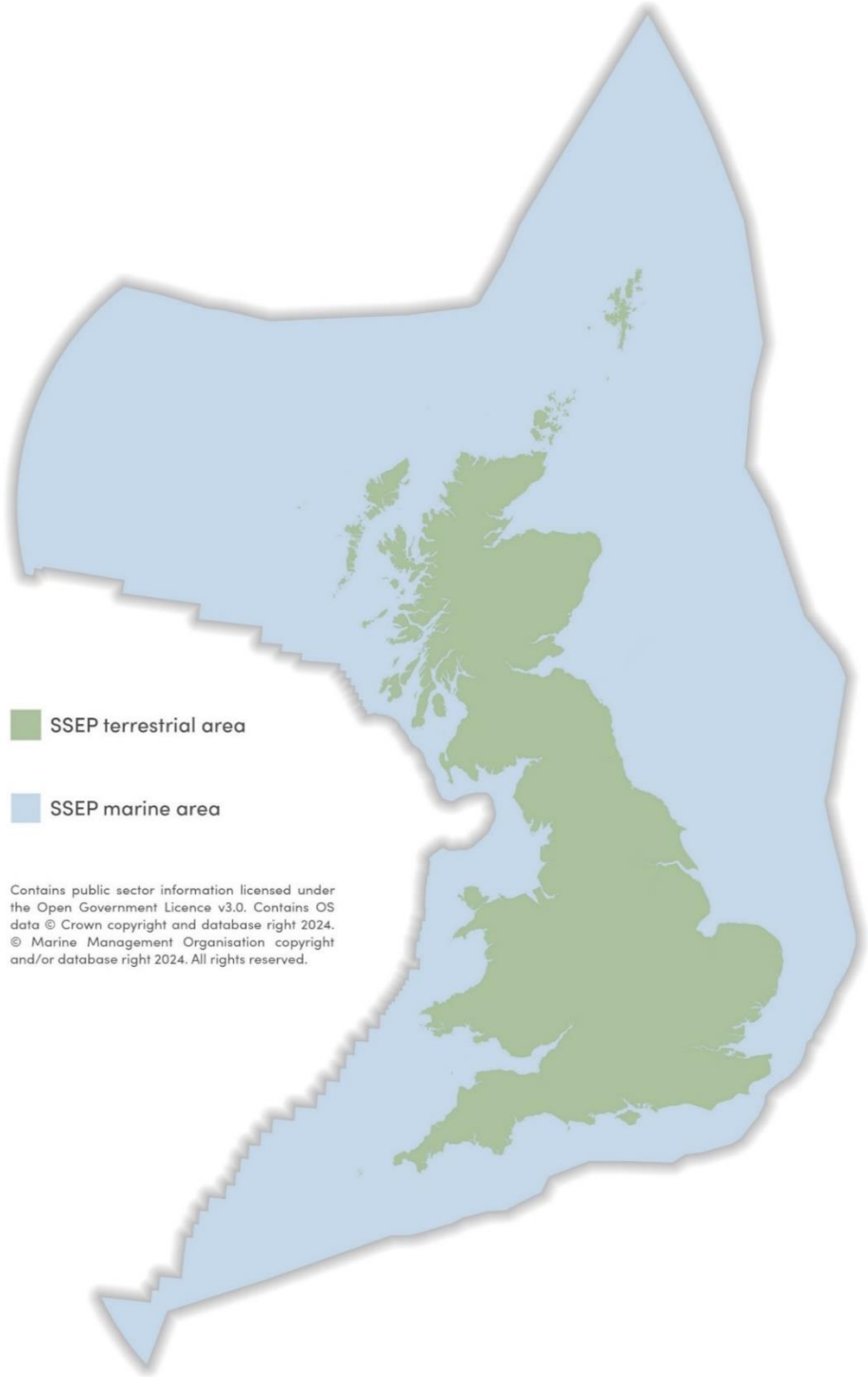
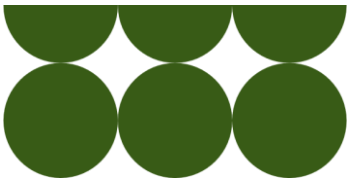


Figure 1.1. SSEP plan area

NESO was commissioned by the UK Government to deliver independent advice on how to achieve a clean power system by 2030. The advice, published on 5 November 2024,



focuses on what is required from a generation and network perspective to achieve that ambition. The Government responded to this advice with the Clean Power 2030 Action Plan on 13 December 2024.[3] This will form the starting point (SSEP baseline) for the SSEP as outlined in the draft methodology published by NESO.

1.3. SEA process for the SSEP

What is SEA?

SEA is a systematic process undertaken to evaluate the likely significant environmental effects of proposed plans and programmes. It is a mechanism for considering and communicating the likely effects of a draft plan and reasonable alternatives in terms of environmental issues, with a view to ensuring that the plan – once finalised – is sound and reflects sustainable development ambitions. In this respect, the SEA will be a tool to help inform stakeholders and decision makers of the potential significant environmental effects of the decisions being made during development of the plan.

Background to the SEA requirements

SEA was introduced to the United Kingdom through EU Directive 2001/42/EC "the SEA Directive" in July 2004. The Directive was transposed into national law through three main avenues in England, Wales and Scotland. The national laws applicable for the SSEP are set out below.

England

SEA is undertaken for plans and programmes in England in line with the procedures prescribed by the Environmental Assessment of Plans and Programmes Regulations 2004 (the SEA Regulations), which previously transposed into national law the EU Strategic Environmental Assessment (SEA) Directive.[4]

The National Planning Practice Guidance in England on SEA and Sustainability Appraisal[5] states that SEA is required to:

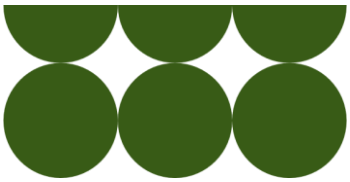
"…promote sustainable development by assessing the extent to which the emerging plan, when judged against reasonable alternatives, will help to achieve relevant environmental, economic and social objectives. This process is an opportunity to consider ways by which the plan can contribute to improvements in environmental, social and economic conditions, as well as a means of identifying and mitigating any potential adverse effects that the plan might otherwise have."

The SSEP has been established as a qualifying plan in accordance with Schedule 1 of the SEA Regulations, with an SEA therefore required.

Scotland

SEA is undertaken for plans, programmes and strategies in Scotland in line with the procedures prescribed by the Environmental Assessment (Scotland) Act 2005 (hereafter

[3] UK Government (2024): Clean Power 2030 Action Plan
[4] Directive 2001/42/EC
[5] UK Government (2015): Strategic environmental assessment and sustainability appraisal



referred to as "the 2005 Act"). The 2005 Act requires all qualifying plans, programmes, and strategies (PPS) to undergo SEA. This provides a systematic process for identifying, reporting and mitigating the environmental impacts of emerging PPS. The SSEP is likely to be a qualifying plan in accordance with Section 5(3) of the 2005 Act, with an SEA therefore required.

Scottish Government Guidance on SEA[6] states that SEA can:

"provide a valuable opportunity to identify and address the environmental implications of public plans. SEA processes can help plan-makers to consider how to deliver a plan differently, in order to achieve better environmental outcomes, while still delivering important plan objectives."

Wales

In Wales, SEA is undertaken to address the procedures prescribed by the Environmental Assessment of Plans and Programmes (Wales) Regulations 2004 (the SEA Regulations). The SEA Regulations apply to a plan or programme relating solely to the whole or any part of Wales; hence the SSEP is potentially a qualifying plan.

The Welsh Government state that guidance from GOV.UK, as outlined in paragraph 1.10 above, should be followed.[7]

The SSEP is likely to be a qualifying plan in accordance with Schedule 1 of the Welsh SEA Regulations, with an SEA therefore required.

Screening the SSEP for SEA

The SSEP has been screened in as requiring an SEA process.[8]

In August 2023, the UK's Electricity Networks Commissioner published its report[9] making a series of recommendations on how to accelerate the deployment of electricity transmission infrastructure, including:

- An SSEP to bridge the gap between Government policy and Network Development Plans, spatially mapping government targets across the whole energy system. To be produced by the Future System Operator (FSO, now NESO).
- A marine environmental assessment (MEA) to be included as part of the SSEP.

In November 2023, the government published a policy paper[10] in response to the Electricity Network Commissioner's report, which sets out that:

- An SSEP should be developed to bridge the gap between government policy and Network Development Plans. The FSO (NESO) is the most suitable body to work with the government to develop the plan.

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[6] Scottish Government (2013): Strategic Environmental Assessment: guidance

[7] Welsh Government (2020): Strategic Environmental Assessment

[8] 'Screening' refers to the initial stage in the SEA process, which determines whether or not SEA is required for a plan or programme.

[9] UK's Electricity Networks Commissioner (2023): Accelerating electricity transmission network deployment: Electricity Networks Commissioner's recommendations

[10] UK Government (2023): Electricity networks: Transmission acceleration action plan

- An SEA is the relevant assessment for the SSEP, which is a process that aims to ensure that environmental issues are taken into account at every stage in the preparation, implementation, monitoring and review of plans, programmes and strategies of a public nature.
- Agreement that a future SSEP will require an onshore and offshore strategic environmental assessment, or an equivalent assessment under the Environmental Outcomes Report system once in force. In addition, a Habitats Regulations Assessment (HRA) should be undertaken to evaluate significant effects on European designated biodiversity sites. The SEA, HRA and offshore delivery route map will be developed across 2024.

In October 2024, the SSEP was commissioned to NESO[11], which sets out that:

- NESO is to create a SSEP for the energy system, land and sea, across GB.
- As part of developing the SSEP, NESO is to conduct an SEA and HRA, in accordance with relevant legislative requirements.

SEA is required for relevant plans and programmes which have the potential to have significant environmental effects. Within this framework, the key factors for the SSEP being screened in as requiring an SEA are as follows:

- The SSEP is a process which is required by legislative, regulatory or administrative provisions.
- The SSEP's plan area will cover the terrestrial and marine areas of GB. Numerous significant environmental constraints are present across this plan area.
- The scope of the SSEP is a spatial plan which will set out a coordinated approach for GB's onshore and offshore energy infrastructure.

These factors suggest that the SSEP is a qualifying plan which has the potential to lead to significant environmental effects across both the terrestrial and marine areas of GB. As such, the SSEP has been screened in as requiring an SEA.

Key stages of the SEA process

The SEA for the SSEP follows the process required by England and Welsh SEA Regulations and the Scottish Environmental Assessment Act. There is guidance published by government on undertaking SEA, specifically 'A Practical Guide to the Strategic Environmental Assessment Directive'; the 'Practical Guide'. This sets out a five-stage process for undertaking SEA. This process, in conjunction with the SEA Regulations, guides this assessment.

[11] Department for Energy Security & Net Zero (2024): Strategic Spatial Energy Plan: Commission to the National Energy System Operator

The stages and outputs for the SEA are replicated in Figure 1.2. Scoping (the current stage) comprises the first stage as set out below.

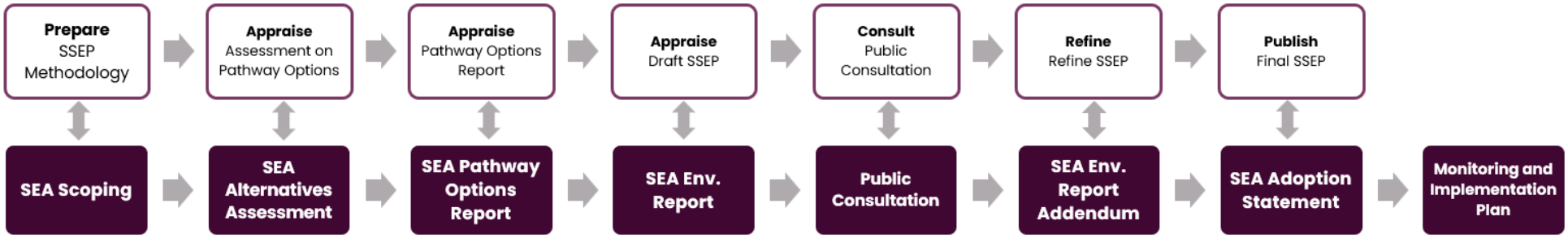

Figure 1.2 Key stages of the SEA for the SSEP, and main SEA outputs

2. Scoping stage for the SEA

This Scoping Report

Approach to scoping

Scoping Report structure

2.1. This Scoping Report

Scoping is the process of determining the range and level of detail of the environmental issues to be addressed in the SEA. The scoping process also identifies the methods to be used, the organisations and/or individuals to be consulted during the assessment, and the timing and length of the consultation period. The scope of the SEA depends on what is likely to be proposed through the plan or programme, its geographical and temporal coverage, and the nature of the receiving environment.

The aim of this Scoping Report is therefore to set out the scope of the SEA for the SSEP for consultees, and to provide a framework for the information to be presented in the forthcoming SEA Reports.

2.2. Approach to scoping

The Scoping Report has been designed to reflect the distinctive nature of the SSEP as a demonstrative energy infrastructure plan covering GB's land and sea areas. In particular it seeks to present the scoping information in an engaging and effective way which reflects the strategic GB scale of the plan, covering both its terrestrial and maritime areas (as shown in Figure 1.1).

The Scoping Report is therefore accompanied by an interactive, online version of the Scoping Report which presents the scoping information through a StoryMap approach. An overview of this is set out below, with additional detail presented in Chapter 4.

An interactive approach to scoping

Given the SSEP covers the whole of GB, and includes multiple terrestrial and marine zones, there is a need to effectively present the evidence base for the SEA in a clear and accessible manner. In response to this, this Scoping Report has been delivered alongside an interactive, online version of the Scoping Report, which spatially illustrates the proposed evidence base for the SEA. This is referred to as the 'Interactive SEA Scoping Report for SSEP'.

The interactive SEA Scoping Report for SSEP, which has been created using ArcGIS StoryMaps, allows the reader to view the evidence base for the SEA. By interacting and engaging with an online digital mapping platform, users will be able to view baseline information and the key issues identified through the scoping process. The reader is able to view this information by both SEA theme and terrestrial / marine zone.

SEA themes through which the SEA information has been presented

The scoping information has been presented through the following SEA themes:

- Air quality
- Climate change
- Community wellbeing
- Cultural heritage and historic environment
- Ecology and biodiversity
- Land and soil resources
- Landscape and seascape

- Water

The selected SEA themes incorporate the 'SEA topics' suggested by Schedule 2 (6) of English and Welsh SEA Regulations and Schedule 3 (6) of the Scottish Environmental Assessment Act. These were refined to reflect a broad understanding of the anticipated scope of the SSEP's effects.

It is intended that presenting the scoping information under these SEA themes will help enable the reader to easily locate the information of greatest interest to them. Once agreed (i.e. subsequent to consultation on this Scoping Report), the suggested scope presented under the eight themes will provide a methodological 'framework' for the SEA of the draft SSEP and reasonable alternatives.

2.3. Scoping Report structure

This Scoping Report is presented through the following sections, reflecting the requirements of Stage 1 presented in Figure 1.2 above:

- Chapter 3 and Appendix A: Present a summary of the objectives of the key policies, plans and programmes that are relevant for the SEA.
- Chapter 4: Sets out how the proposed baseline information for the SEA is presented, including in this report and the interactive Scoping Report.
- Chapters 5-26: Present the baseline information and key issues by spatial zone.
- Chapter 27: Presents the proposed SEA framework, which sets out a series of objectives and assessment questions against which the draft SSEP and reasonable alternatives will be assessed.
- Chapter 28: Presents the next steps for the SEA process.

3. Links with other policies, plans and programmes

Policy, plan and programme review

3.1. Policy, plan and programme review

The SEA should consider the relationship between the SSEP and other relevant policies, plans and programmes (PPPs). In this context, the contents of the SSEP will be partially influenced by, and will also have some influence over, objectives presented within other policies, plans and programmes that are produced internationally, UK-wide and across England, Scotland and Wales.

To engage this process, the scoping process has undertaken a review of the key PPPs of relevance for the SSEP. The review has focussed on the PPPs which are adopted or close to adoption; in this respect those which are early on in the PPP-making process (for example at early consultation stage) have not been included in the review.

The full PPP review is presented in Appendix A. This presents, for each of the SEA themes, a review of the key international, UK-wide, English, Scottish and Welsh PPPs. It includes the details of each PPP, and a summary of the key objectives as relevant to the SEA for the SSEP.

The outline below provides a summary of the implications of the relevant policies, plans and programmes for the SSEP.

Air quality

PPPs relating to the air quality SEA theme seek to improve air quality as well as reduce exposures to poor air quality by sensitive receptors (such as humans, flora or fauna). The following key focus areas are highlighted by the PPPs:

- Setting legally binding air quality limits for major air pollutants, with measures set to ensure that future proposals are planned to adhere to air quality standards.
- Minimising the contributions to poor air quality from various sectors, including transport, industrial uses, homes, agriculture, and construction, with measures to deliver national air quality objectives across the public and private sectors.
- A focus on minimising poor air quality sits alongside support for innovation and solutions which seek to minimise disruption and restrictions to key sectors.
- Air quality is a key factor in determining human health and healthy ecosystems, with improvements in air quality anticipated to support a range of positive socio-economic and environmental outcomes.

Climate change

PPPs relating to the climate change SEA theme are broadly split into two priority areas: resilience to the effects of climatic changes (increasing global temperatures and a higher prevalence and increased intensity of extreme weather events); and mitigation, relating to efforts to reduce human derived greenhouse gas emissions. The following key focus areas are highlighted by the PPPs:

- Decarbonisation should be promoted through energy efficiency measures which reduce energy consumption as well as low carbon technologies which reduce reliance upon fossil fuels and generate clean energy via sustainable means. This is to be applied to all sectors, with housing, transport and industry being key areas of focus.

Carbon capture and storage and greenhouse gas removal is an element of this and will contribute towards reaching net-zero.

- There is a UK Government set target to reach net-zero carbon emissions by 2050 and decarbonise the power system by 2030. In addition, the Scottish Government set a target to reach net-zero by 2045.
- Where possible, and whilst ensuring the reliability of the power system, renewable energy generation should be prioritised.
- Clean economic growth should be supported through technological innovations and energy transformations.
- Energy security should be prioritised in a manner which minimises risks to energy supplies for GB from global and sector-based pressures. This, in turn, should help to reduce domestic vulnerabilities to market price fluctuations.
- A focus should be placed on strategic and integrated planning for future demand, supply and infrastructure requirements.
- Adaptation is the key solution for managing impacts of climate change over the next few decades, with key sectors expected to take steps to reduce vulnerabilities to climatic changes. Nature based solutions are seek as a key solution to help adaptation efforts, with multi-faceted benefits to assisting with sustainable development.

Community wellbeing

PPPs relating to the community wellbeing SEA theme have a wide focus, including on health and wellbeing, community participation in decision-making, inequalities and education. The following key focus areas are highlighted by the PPPs:

- Health and wellbeing should be promoted through spatial and non-spatial interventions which allow good access to healthcare, healthy and active lives and access to natural spaces including green and blue infrastructure.
- Community participation in decision-making and consenting should promote community-level concerns and priorities, whilst also steering decision-making towards strategic aims.
- Inequality should be addressed, and efforts should be made to ensure equal access to good health, education and employment opportunities.
- Education and employment opportunities should be ensured for all, providing prosperity and security for communities.
- Environmental factors can have a significant impact upon human health and wellbeing, and so proposals must consider this and mitigate potential effects.
- Safety and the perception of safety should be addressed through high quality design, allowing crime and the fear of crime to be reduced through physical and non-physical interventions.

Cultural heritage and historic environment

PPPs relating to the historic environment and cultural heritage SEA theme largely focus on conserving and enhancing both the physical and non-physical elements of the historic environment and cultural heritage and improving understanding of the resource. The following key focus areas are highlighted by the PPPs:

- Opportunities for the conservation and enhancement of heritage assets, including their setting, should be identified through proposals.
- Cultural heritage is closely linked to the historic environment. It connects people with place, and with traditions, stories and memories linked to those places.
- Archaeology is a key aspect of the historic environment. In this respect positive engagement with development-led archaeology, underpinned by rigour at key stages, will support understanding of the archaeological resource.
- The landscape or townscape setting of an asset or area are of importance when considering the significance of a heritage asset.
- There is a need to enhance access to and understanding of the historic environment resource and cultural heritage.
- There is a need to increase the resilience of the historic environment to the likely impacts of climate change.

Ecology and biodiversity

PPPs relating to the ecology and biodiversity SEA theme largely focus on protecting habitats, species and ecological networks across GB. The following key focus areas are highlighted by the PPPs:

- Halting and reversing biodiversity loss, including by addressing the impact of invasive non-native species and climate change on biodiversity.
- Promoting biologically diverse oceans and seas.
- Restoring GB's protected sites to favourable condition.
- Delivering biodiversity net gain and developing principles for marine net gain.
- Establishing a 'nature recovery network' to expand and connect habitats.
- Increasing the resilience of habitats, species and ecological networks to the likely impacts of climate change.

Land and soil resources

PPPs relating to the land and soil resources SEA theme largely focus on protecting greenfield and productive agricultural land, as well as minerals and underground carbon sinks, across GB. The following key focus areas are highlighted by the PPPs:

- Ensuring land is used efficiently, including protecting greenfield land where it contributes positively to people and/or the environment.
- Conserving areas of the best and most versatile agricultural land.
- Protecting soil health (which is important for food production) from the impacts of climate change, such as increased flooding and drought, and in doing so safeguarding the ability of soil to provide essential services for future generations.
- Improving the ability of soil to store carbon in order to support climate change mitigation, maximising the positive relationship between trees and soil.
- Preventing the contamination of land and pollution to soil.

Landscape and seascape

PPPs relating to the landscape and seascape SEA theme largely focus on protecting and enhancing landscape and seascape character across GB. The following key focus areas are highlighted by the PPPs:

- Protecting and managing the special qualities of nationally designated landscapes, including National Parks, National Landscapes (England and Wales), and National Scenic Areas (Scotland).
- Protecting the features that contribute to landscape character, including trees and woodlands and heritage assets.
- Promoting nature recovery and enhancing the beauty of landscapes.
- Ensuring that landscapes and seascapes continue to contribute to local cultural resources, including human wellbeing and local identity.

Water

PPPs relating to the water SEA theme largely focus on maintaining and improving water quality, securing water availability and managing flood risk across GB. The following key focus areas are highlighted by the PPPs:

- Maintaining a supply of clean and plentiful water, including by ensuring water is used efficiently, planning for population growth and by increasing the resilience of water supplies to natural hazards such as droughts and floods.
- Implementing pollution control for the disposal of wastes to water by ensuring adequate water and wastewater infrastructure is in place.
- Improving the water environment, including the ecological and chemical health of river, lake, groundwater, estuarine and coastal waterbodies.
- Identifying risks to the viability and diversity of freshwater habitats and species.
- Enhancing the resilience of water resources to the impacts of climate change.
- Effectively managing flood risk, including fluvial, surface water, groundwater and coastal flooding. Factoring in the likely impacts of climate change over forthcoming decades, flood risk management should seek to where appropriate engage techniques such as sustainable drainage systems, nature-based solutions and other innovative approaches.

4. Establishing the baseline and key issues for the SEA

Baseline information for the SEA

Key issues for the SEA

Presenting the SEA baseline and key issues through a zonal approach

4.1. Baseline information for the SEA

A key element of scoping is the establishment of the evidence base for the SEA. Central to this process is to determine the baseline information in the areas covered by the SSEP.

This Scoping Report has therefore presented a series of summaries of the existing environmental baseline for the geographical area covered by the SSEP. This has been achieved by undertaking a zonal approach, with the SSEP plan area being divided up into a series of spatial zones, presenting the baseline information in a more manageable format for the purposes of the scoping stage of the SEA. The information for each zone is presented by SEA theme and reflects information which is currently available.

4.2. Key issues for the SEA

Drawing on the baseline information, and informed by the PPP review, a series of key environmental issues and opportunities have also been identified and presented for each of the spatial zones. These relate to the areas where the SSEP may have influence, or instead those which may influence the SSEP.

The key issues have subsequently informed the development of a series of objectives and assessment questions against which the SSEP can be assessed; these form part of the SEA framework discussed and proposed in Chapter 27.

The baseline information and key issues identified are presented in chapters 5-26 of this report. It is also supported through an interactive, online version of the Scoping Report. The online version of the Scoping Report augments the main body of this Scoping Report through presenting the SEA scoping information in an interactive, accessible and engaging way.

4.3. Presenting the SEA baseline and key issues through a zonal approach

To support the collation and presentation of the baseline information for the SEA, the plan area for the SSEP (Figure 1.1), has been subdivided spatially into the following zones:

- 13 terrestrial zones
- 9 marine zones

Terrestrial zones cover the land part of the plan area, with the marine zones covering the marine areas up to mean high water spring tides.

An explanation of these zones is set out below, with the areas covered by the zones presented in Figure 4.1 overleaf.

It should be noted that these zones have only been used for the purposes of presenting the SEA scoping information. They are intended to support the effective and clear presentation of the SEA baseline information, reflecting the strategic nature of the forthcoming assessment process, and should not be interpreted as the zones to be used for the final SSEP.

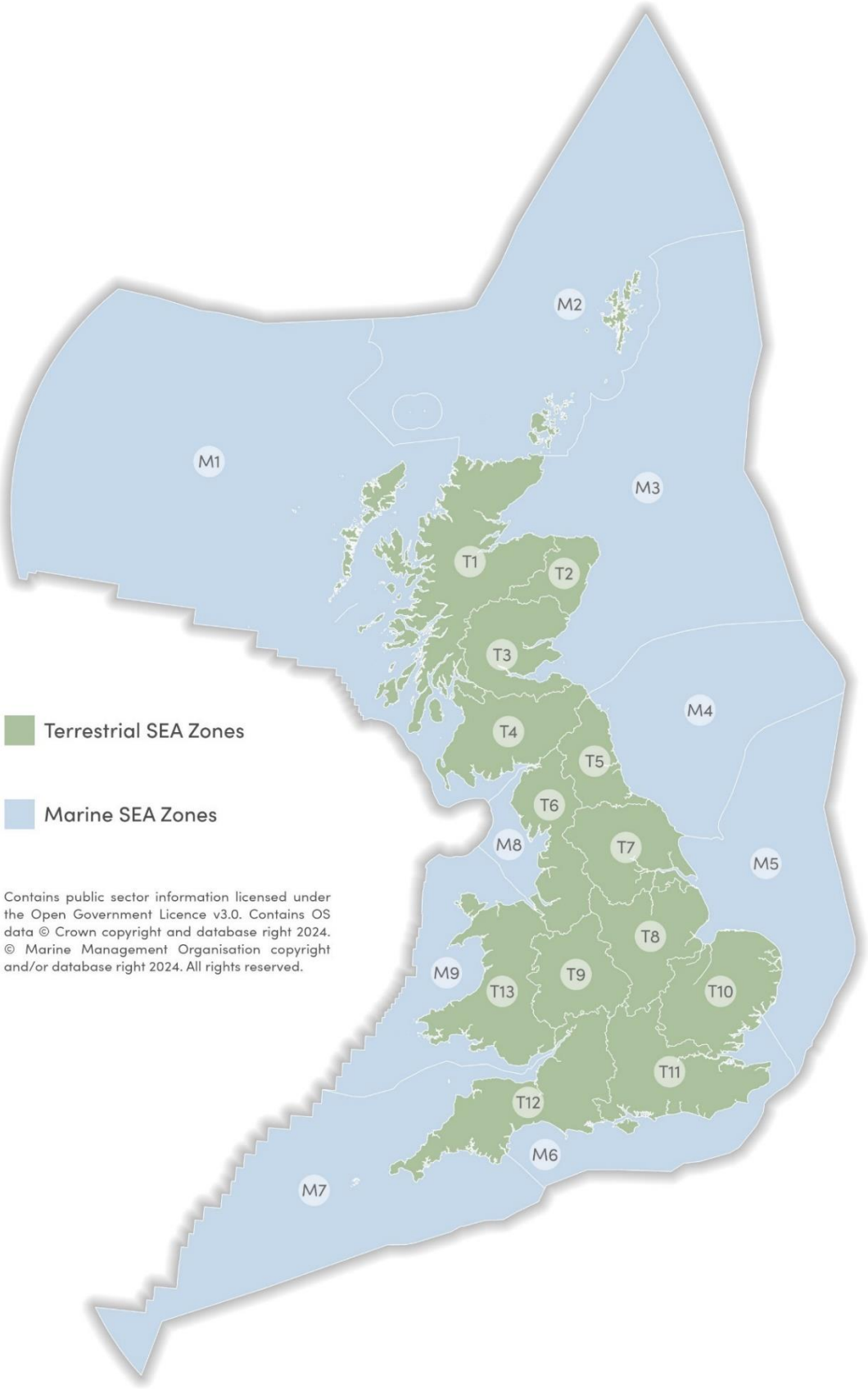

Figure 4.1: Terrestrial and marine zones used for the purposes of presenting the SEA scoping information

Terrestrial zones

The terrestrial zones used to present the SEA scoping information have utilised International Territorial Level (ITL) boundaries.

ITLs are a hierarchical classification of administrative areas in the UK used by the Office for National Statistics, and adopt a convention used by the OECD member countries. ITLs therefore align with international standards, enabling comparability internationally.

There are three levels of ITLs in the UK

- ITL 1 – Regions.
- ITL 2 – Counties and groups of counties.
- ITL 3 – Counties and groups of unitary authorities.

For **England**, ITL1 boundaries have been used for the purposes of presenting the SEA scoping information. They correlate with the regions of England (formerly known as the government office regions) – the highest tier of sub-national division in England. ITL1 boundaries have also been used for **Wales**. Wales is one ITL1 'region' and is comparable in size and population to many of the English regions.

For **Scotland**, ITL2 boundaries (2021) have been used.[12] ITL 2 boundaries are appropriate to use for the terrestrial zones in Scotland (as opposed to ITL 1 boundaries) because they cover a similar area to the ITL 1 boundaries for England and Wales.

The zones, as chosen, recognise the nations of GB and their terrestrial/marine boundaries, whilst also utilising an established spatial approach whereby zones are broadly of comparative size.

The terrestrial zones used for the purposes of SEA scoping are listed below, with their boundaries presented in Figure 4.1.

- **T1**: Scotland – Highlands and Islands
- **T2**: Scotland – North Eastern
- **T3**: Scotland – Central and Eastern
- **T4**: Scotland – Southern
- **T5**: England – North East
- **T6**: England – North West
- **T7**: England – Yorkshire and the Humber
- **T8**: England – East Midlands
- **T9**: England – West Midlands
- **T10**: England – East of England
- **T11**: England – South East
- **T12**: England – South West
- **T13**: Wales

[12] Since work on this report commenced, updated ITL2 boundaries have been released (January 2025). In Scotland, the new ITL2 boundaries more closely align with administrative geographies.

Marine zones

The marine zones used for the purposes of presenting the SEA scoping information draws on the established approaches to marine planning in England, Scotland and Wales.

In **England**, the Marine Management Organisation (MMO) is responsible for preparing marine plans. As part of this process, eleven Marine Plan Areas were established. These are listed below.

- North East inshore and offshore
- East inshore and offshore
- South East inshore
- South inshore and offshore
- South West inshore and offshore
- North West inshore and offshore

For the purposes of SEA scoping, the inshore and offshore regions of each of the Marine Plan areas have been combined. In addition, the South East area has been combined with the South area with the aim of maintaining a similar area across each zone. This results in five marine zones for England.

In **Scotland**, eleven Scottish Marine Regions (SMRs) have been established, which cover sea areas extending out to 12 nautical miles. In addition, ten Offshore Marine Regions (OMRs) have been established for Scotland.

For the purposes of SEA scoping, it is appropriate to combine these SMRs and OMRs into three regions for Scotland – north, east and west. This is with the aim of maintaining a similar area across the marine zones for each country. These marine zones in Scotland are therefore as follows:

- North – combining the North Coast, Orkney Islands, and Shetland Isles SMRs with the North Scotland Shelf, Faroe Shetland Channel, and North and West Shetland Shelf OMRs.
- East – combining the Moray Firth, North East, and Forth and Tay SMRs with the East Shetland Shelf, Fladen and Moray Firth Offshore, and Long Forties OMRs.
- West – combining the West Highlands, Outer Hebrides, West Highlands, Argyll, Clyde, and Solway SMRs with the Rockall, Bailey, and Hebrides Shelf OMRs.

In **Wales**, one marine zone has been established for the purposes of SEA scoping. This combines the Welsh inshore region (from mean high water spring tides out to 12 nautical miles) and offshore region (beyond 12 nautical miles) as set out in the Welsh National Marine Plan (2019). This is in line with the approach taken for England and Scotland's marine areas.

The marine zones used for the purposes of SEA scoping are listed below, with their boundaries presented in Figure 4.1.

- **M1**: Scotland – West
- **M2**: Scotland – North
- **M3**: Scotland – East
- **M4**: England – North East

- **M5**: England – East
- **M6**: England – South and South East
- **M7**: England – South West
- **M8**: England – North West
- **M9**: Wales

It is viewed that these nine marine zones cover appropriately sized zones which effectively reflect the strategic nature of the SEA process for the SSEP.

The following chapters therefore present the **baseline information** and **key issues** for each of the terrestrial and marine zones identified above.

5. Zone T1: Highlands and Islands, Scotland

Overview of Zone T1

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for T1

5.1. Overview of Zone T1

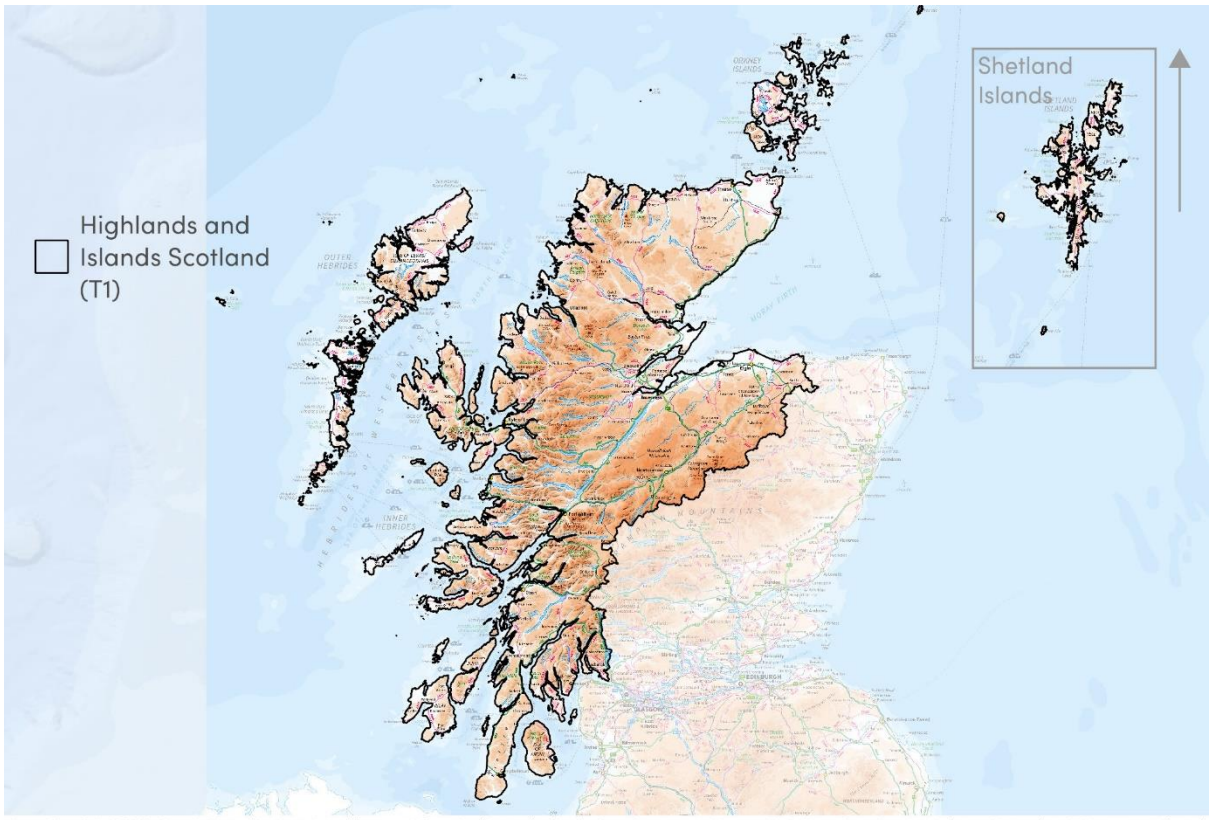

Figure 5.1: Area covered by Zone T1 – Highlands and Islands, Scotland[13]

Zone T1 comprises the Highlands and Islands region of Scotland.

Zone T1 covers an area of **41,517 km²** (see Figure 5.1 above). Whilst it is the largest terrestrial zone by area, it is the most sparsely populated with a population of **under 0.5 million** (2022). The area is host to the city of Inverness; however, it is predominantly rural, with numerous islands, including those of the Inner and Outer Hebrides, the Orkney Islands, and the Shetland Islands.

The zone's economy is heavily reliant upon fishing, tourism and agriculture, with the long coastline and highly valued landscapes being key natural assets for the area. With 29 National Scenic Areas and two National Parks, the mountainous, upland and hilly topography plays a central role in the zone's character. The range of ecological assets found across the zone, which are frequently designated for their international and

[13] Please note the Shetland Islands have been included as a box in the mapping for this zone to facilitate effective presentation of the constraints. The constraints for this chapter represent the terrestrial part of the Highlands and Islands.

national importance, highlight the strong role the natural environment plays within this zone.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

5.2. Air quality

Air quality issues in the zone are limited and largely associated with traffic and transport in Inverness. There is **one Air Quality Management Area (AQMA)** in the zone, located in Inverness City Centre (**1**), which incorporates 6 Queensgate and 62 Academy Street, Inverness (see Figure 5.2 below). This AQMA was designated in 2014 and is primarily designated for exceedances in the annual mean concentration objective of 40µg/m^3 for nitrogen dioxide (NO_2).

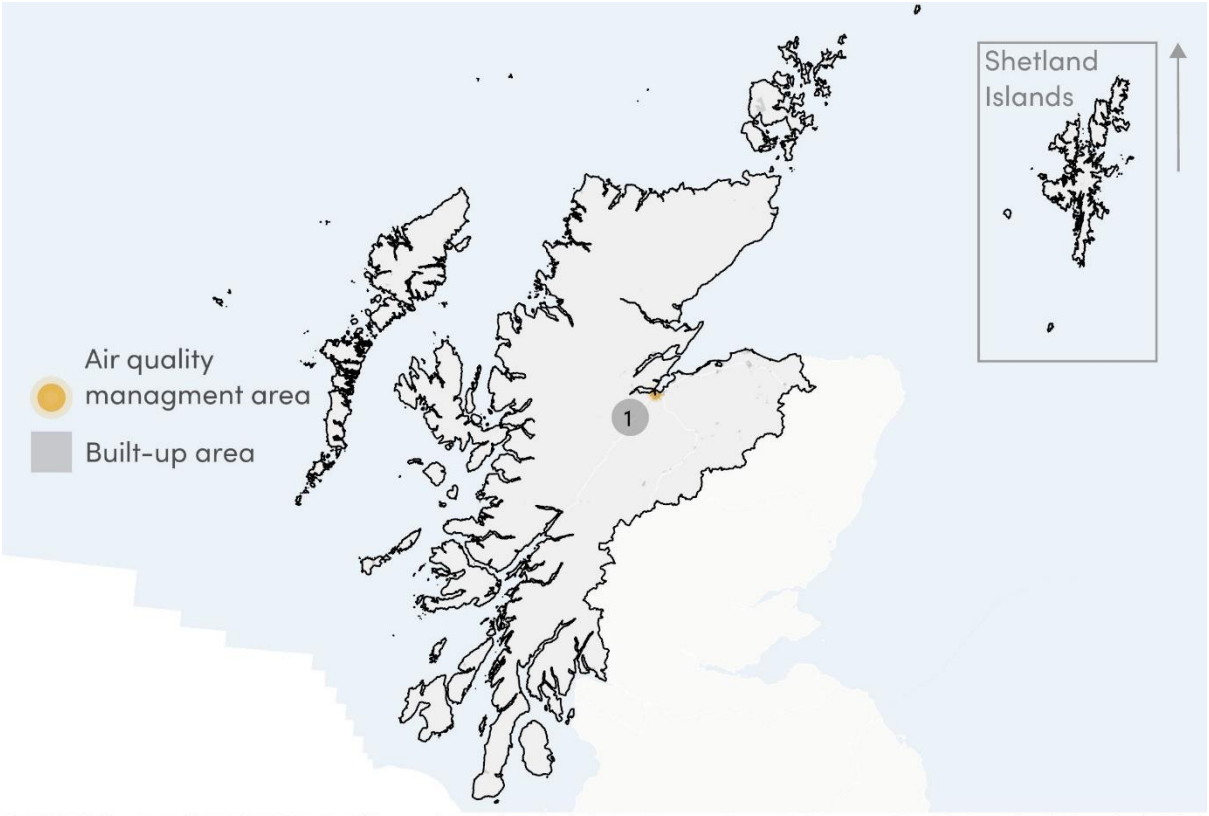

Figure 5.2: AQMAs in Zone T1

5.3. Climate change

In this zone, total greenhouse gas (GHG) emissions amounted to **4,634.1 kt CO_2e** in 2022. The largest contributor to this total was the **agriculture sector** (approx. 27.7%), followed by the land use, land use change and forestry sector (approx. 23.7%) and then the transport sector (approx. 18.6%)[14].

[14] UK Government (2022): UK local authority and regional greenhouse gas emissions statistics

The importance of peatland to the climate crisis in Scotland is recognised – with the Scottish Government pledging more than £250 million up to 2030 to support restoration projects.[15] Given that there are significant areas of Class 1 and Class 2 soil in this zone (nationally important carbon-rich soils, deep peat and priority peatland habitat[16]), the zone plays a key role in **carbon storage**. A key area is the Flow Country, which has been designated as a World Heritage Site due to its role as a most outstanding example of an actively accumulating blanket bog landscape (discussed under Cultural Heritage below).

Primary impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections (UKCP18)[17], winters in Scotland are anticipated to be 1.24°C warmer between 2021-2040 and 2.8°C warmer between 2061-2080 in comparison to 1981-2000 (1.8°C). Warmer summers are also anticipated - with a 1.72°C increase anticipated for 2021-2040, and a 4°C increase for 2061-2080 in comparison to 1981-2000 (11.89°C). Winters in Scotland are anticipated to be wetter (increasing to 6.5mm/day in 2061-2080 in comparison to 5.82mm/day in 1981-2000), and drier in the summer (decreasing to 3.27mm/day in 2061-2080 in comparison to 3.93mm/day in 1981-2000)[18].

Whilst due to isostatic uplift, **sea level rise** will be less pronounced in this zone than in other parts of the UK, coastal change is likely to be exacerbated by climate change.

Secondary impacts from climate change are largely linked to changes in temperature, humidity and precipitation. These can be widespread and impact upon ecosystems, people, settlements and infrastructure. Changes in precipitation patterns can lead to an increase in flood events or the occurrence of drought, which can impact on agriculture and natural resources. Increased temperatures can also result in heat-related human mortality, and cause species loss. Additionally, higher temperatures and the occurrence of heatwaves can aggravate air pollution events and also limit the function of key infrastructure – including compromising energy systems. The Intergovernmental Panel on Climate Change (IPCC) outlines that the energy sector is climate-exposed, indicating that energy infrastructure will become increasingly vulnerable if design standards do not account for changing climate conditions[19]. Infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems are viewed as the most feasible adaptation techniques – alongside energy generation diversification (i.e., a greater use of renewable energy)[20].

5.4. Community wellbeing

The population of the Highlands and Islands zone is **490,341** (Scottish Census 2022). The population density of the zone is the lowest in Scotland, with density averaging 8.6

[15] NatureScot (no date): Peatland ACTION – What we do
[16] NatureScot (2016): Carbon and Peatland 2016 map
[17] Met Office (no date): UKCP data
[18] Based on the RCP8.5 emissions scenario, which assumes there is fast population growth, low technical development rate, slow GDP growth, a massive increase in world poverty and high energy use and emissions. It also assumes no climate change mitigation or adaptation techniques are engaged with.
[19] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[20] IPCC (2019): Climate Change and Land

residents per square km in the Eilean Siar local authority area and increasing to 41.7 in Moray, the local authority area with the highest population density in the zone.

The Highlands and Islands has a higher percentage of people of **retirement age** and above at 24.4%, compared to the Scottish average of 20.1% (see Figure 5.3 overleaf). This age profile pattern is likely to persist in the medium term, as the zone also has a higher than Scottish average proportion of people aged 50 to 64 (Scottish Census 2022).

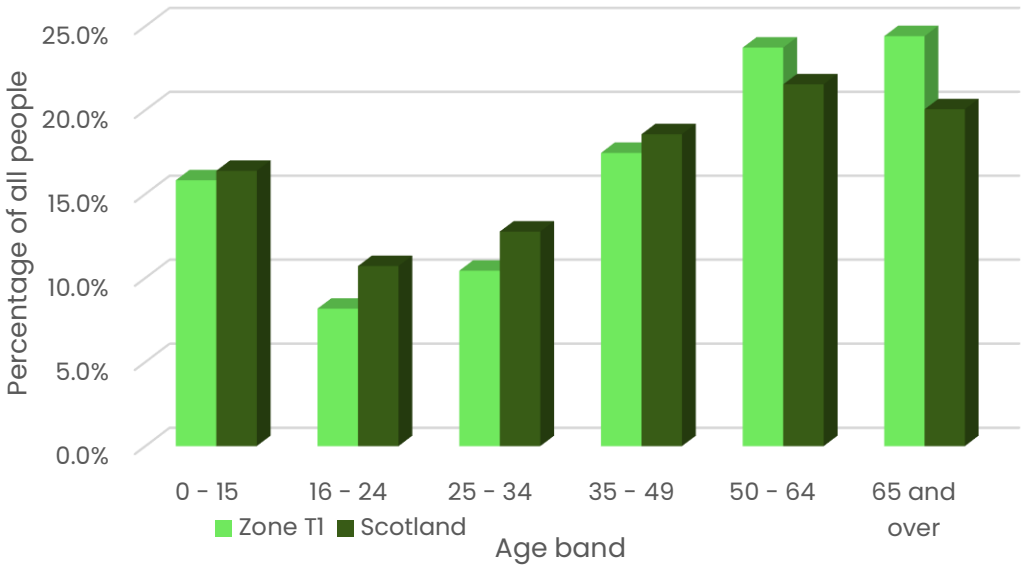

Figure 5.3: Age profile of Zone T1 (source Scottish Census 2022)

Index of Multiple Deprivation (IMD) data from 2019 shows that overall, the zone has lower levels of **deprivation** compared to other zones in Scotland. Particular pockets of deprivation in the zone include in Inverness and Alness. Otherwise, the zone has varied levels of deprivation throughout, in some areas established through indices of a small number of households. Accessibility to services, facilities and employment opportunities is also a key issue across the zone.

Key **'traditional' economic sectors** in the zone include agriculture, fishing and mining. The popularity of the region as a holiday destination also means tourism makes a significant seasonal contribution to the local economy. Other sectors include renewable energy generation and forestry; these have a key role in the energy transition.

Crofting, which is a system of landholding, plays an important role in many aspects of life in the Highlands and Islands. A croft is a relatively small agricultural land holding, which is normally held in tenancy, and which may or may not have buildings or a house associated with it. Crofts range in size from less than 1/2 hectare to more than 50 hectares, but an average croft is nearer 5 hectares. More than 750,000 hectares of land in Scotland is in crofting tenure, with approximately 33,000 people living in crofting households. Croft land has provided the basis for the pattern of settlement and township structure, and its association with common grazings has entailed the sharing of resources

and co-operative working, which in turn provides for shared responsibilities and sense of identity.[21]

Land reform continues to be a consideration for local communities in the Highlands and Islands. The Land Reform (Scotland) Bill, introduced to Parliament in March 2023, included measures that will apply to large landholdings of over 1,000 hectares, prohibiting sales in certain cases until Ministers can consider the impact on the local community. This seeks to empower communities with more opportunities to own land through introducing advance notice of certain sales from large landholdings, and also places legal responsibilities on the owners of the very largest landholdings to show how they use their land and how that use contributes to key public policy priorities, such as addressing climate change and protecting and restoring nature.

In Zone T1, the industries with the **highest regional gross value added (GVA) in 2022**[22] were the services sector and production sector.

The zone has an excellent **rights of way network**, and is a centre for nature-based recreation, leisure and tourism. Examples of long-distance trails include the 151 km West Highland Way, the 235 km John o' Groats Trail between Inverness and John o' Groats, the 378 km Cape Wrath Trail, the 117km Great Glen Way the 128 km Rob Roy Way and the 253 km Hebridean Way. A number of these form part of the Scottish National Trail.

Gaelic is spoken by around 65,000 people in the zone, which equates to 13.8% of the zone's population. It is strongest in the Western Isles but there are substantial Gaelic communities elsewhere in the Highlands & Islands.

Gaelic is currently enjoying a revival, and central to supporting this revival have been developments in education and in promoting Gaelic culture. Gaelic-medium education at both primary and secondary levels have undergone unprecedented growth, Gaelic is increasingly used on road signs notices and in advertisements, and with the setting up of a fund to provide a Gaelic television service in 1992, more Gaelic television and radio programmes are now available than in the past. At the same time there has been a healthy and growing interest in Gaelic music and arts and such organisations as Fèisean nan Gàidheal, Ceòlas and the Blas Festival have been at the forefront of raising awareness of and skills in Gaelic traditional music and songs. The establishment of Bòrd na Gàidhlig (The Gaelic Board) to promote Gaelic both in Scotland and around the world builds on the work being done in this field by such bodies as An Comunn Gàidhealach (The Gaelic Association), Comunn na Gàidhlig (The Gaelic Council) and local authorities including Highland Council.

5.5. Cultural heritage and historic environment

Zone T1 has a rich and diverse **historic environment** and cultural heritage resource. This reflects the historic evolution of the component areas of the zone, including:

- The role of the Orkneys and the north of Scotland as a centre for Neolithic, Bronze Age and Iron Age culture.

[21] Crofting Commission (2025): What is crofting?
[22] ONS (2024): Regional gross value added (balanced) by industry: all ITL regions

- The development of the Pictish culture; the colonisation of western Scotland by the Scots from Northern Ireland around 500 AD, bringing with them the Gaelic language and Christianity.
- The settlement of Orkney, Shetland and the west coast islands by the Vikings.
- The development of the clan system, struggles between Scotland and the English, and between the Highland clans and the Scottish king.
- The Jacobite rebellions and Highland Clearances of the 18th century.
- The development of the Highlands as a tourist destination and establishment of hunting and shooting estates in the 19th century.
- Longer term diversification of the Highland and Islands' economy.

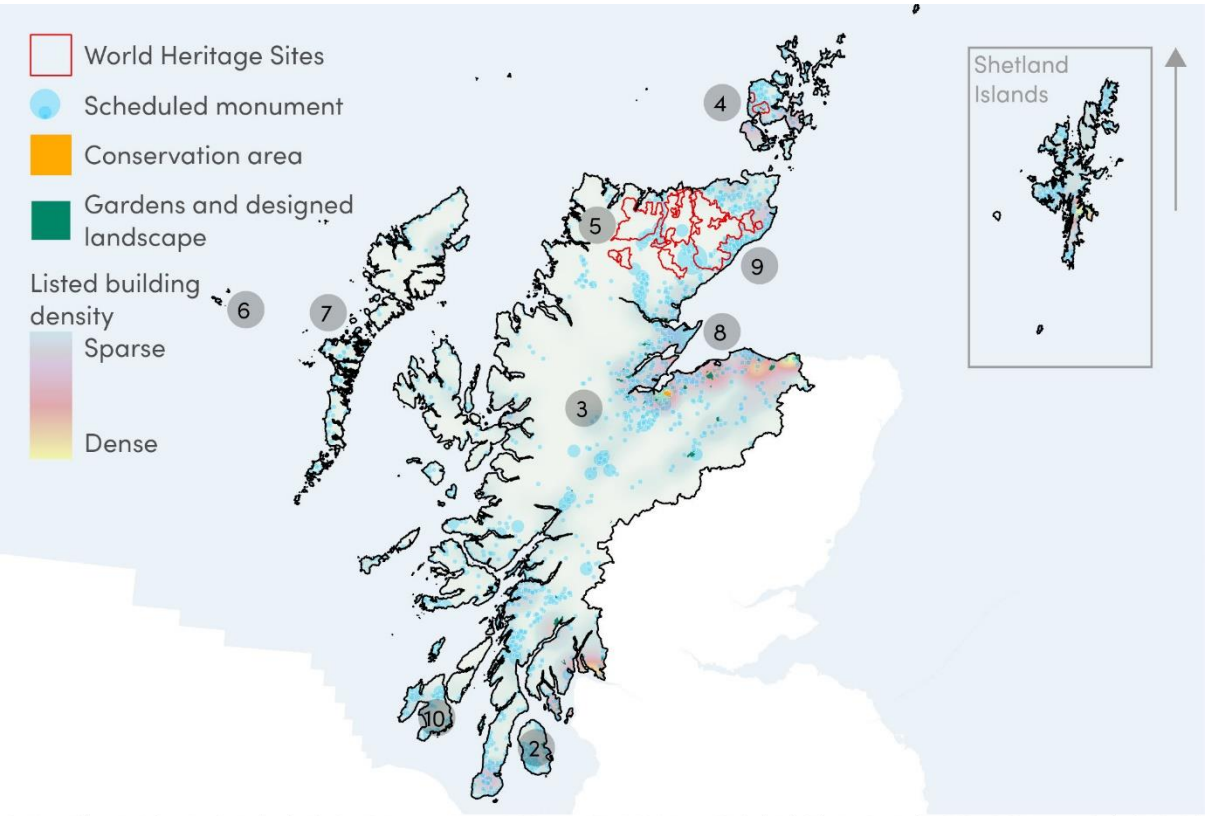

Figure 5.4: Designated heritage assets within Zone T1

Key features of Zone T1's historic environment are shown in Figure 5.4 above, and include:

- **Neolithic Arran** (**2**): The Isle of Arran contains one of the largest concentrations of Neolithic and early Bronze age monuments in the UK.
- **Prehistoric Orkney and Shetland Islands**: The Orkney and Shetland Islands are extremely rich in prehistoric, and in particular, Neolithic remains. In addition to being a centre of Neolithic culture, the construction of buildings in stone (due to the lack of wood) has meant that large concentrations of archaeological sites remain.
- **Early Christian settlement**: Whilst the Celtic people of Scotland were likely to have been exposed to Christianity through their contact with the Romans, it was not until the 6th century that the new religion made inroads in the northern region through missionary activities. The most well-known of these is Columba, who established a

monastery on the island of Iona, off Mull. From this base Celtic Christian beliefs were extended across the zone and this process helped the establishment of an independent kingdom of Scots based in Argyll. An integral aspect of the cultural heritage of the west of Scotland, the Scots brought with them from Northern Ireland the Gaelic language.

- **Viking settlement**: From the 8th century, there were significant Norse incursions into parts of Zone T1. The area of Norse settlement, known as the Kingdom of the Isles, had two parts: the South Isles encompassing Innse Gall (the Hebrides) and the Isle of Man; and the North Isles of Orkney and Shetland, where Norse influence was strongest and most long lasting. Whilst in the Outer Hebrides the archaeological record is scarce, the Norse culture is particularly embedded within Shetland and the Orkney Islands, which only became part of Scotland in the 15th century.
- **Historic legacy of the Highland Clearances**: The Highland Clearances took place between approximately 1750 to 1860. In the aftermath of the Jacobite risings and the Battle of Culloden, and the resultant subjugation of the Highlands and attempted destruction of the clan system, arable land and grazing were taken from tenants and consolidated, with large scale sheep grazing replacing previous activities. Where people had lived in clachans or townships and farmed communally, they were now uprooted to the coast and each given land or 'crofts' for agriculture. As a result of the inhibition of tree regeneration by sheep grazing, this legacy continues to heavily influence much of the Highlands and Islands' landscape, which comprises in many areas deforested rough grazing areas (with exceptions such as Islay).
- **Development of sporting estates**: During the latter part of the 19th century a large number of sporting estates were set up in the Highlands for the purposes of hunting, fishing and deer stalking. These continue to constitute a large part of the land area of the Highlands and Islands.
- **20th century hydropower development** (**3**): Between the 1940s and 1960s, the North of Scotland Hydro-Electric Board designed and constructed numerous hydropower projects across the zone. The biggest developments in hydropower in the Highlands came during the 1950s and 1960s, with the aim of initiating large-scale industrial engineering exercises to exploit significant previously untapped Hydro potential across the Highlands.

There are three **World Heritage Sites (WHSs)** located in Zone T1 (as shown in Figure 5.4 above). These are:

- **Heart of Neolithic Orkney** (**4**): The group of monuments that make up the Heart of Neolithic Orkney consists of a remarkably well-preserved settlement, a large, chambered tomb, and two stone circles with surrounding henges, together with a number of associated burial and ceremonial sites. The group constitutes a major relict cultural landscape graphically depicting life five thousand years ago in this remote archipelago. The four monuments that make up the Heart of Neolithic Orkney are among the most important Neolithic sites in Western Europe. These are the Ring of Brodgar, Stones of Stenness, Maeshowe and Skara Brae. They provide exceptional evidence of the material and spiritual standards as well as the beliefs and social structures of this dynamic period of prehistory.
- **The Flow Country** (**5**): The serial property is considered the most outstanding example of an actively accumulating blanket bog landscape. This peatland ecosystem, which

has been accumulating for the past 9,000 years, provides a diversity of habitats home to a distinct combination of bird species and displays a remarkable diversity of features not found anywhere else on Earth. Peatlands play an important role in storing carbon and the property's ongoing peat-forming ecological processes continue to sequester carbon on a very large scale, representing a significant research and educational resource.

- **St Kilda** (**6**) was inscribed as a UNESCO WHS in 1986, recognising its outstanding natural and cultural significance. The WHS encompasses a volcanic archipelago situated off the coast of the Hebrides, renowned for its dramatic landscapes, including high cliffs and sea stacks. St Kilda is an internationally important area for seabirds, being home to the UK's largest colony of Atlantic puffins. The site also has a rich human history, with evidence of continuous habitation for at least 2,000 years until the latest residents left in 1930.

The archaeological interest of Orkney, Shetland and Arran have been discussed above. Other particular concentrations of **scheduled monuments** in the zone include:

- **North and South Uist and Barra** (**7**): Incorporating the low-lying fertile plain making up much of the west coast of Na h-Eileanan Siar, the area includes a wealth of Neolithic, Bronze Age and Iron Age remains, early Christian archaeology and evidence of Viking settlement.
- **Moray Firth and Cromarty Firth (including Tarbat and the Black Isle)** (**8**): The area has a rich wealth of Neolithic, Bronze Age, Pictish and early medieval remains.
- **Caithness** (**9**): Including: large concentrations of Neolithic long or round cairns; Bronze Age round cairns and stone rows; Iron Age brochs; early Christian sites; medieval fortifications and castles built by successive Earls of Caithness and Sutherland (such as Girnigoe and Sinclair Castles); evidence of pre-Highland clearance settlements; and World War II pillboxes, coastal defences and anti-aircraft structures.
- **Islay** (**10**): Mesolithic artefacts; numerous finds from the late Neolithic-early Bronze Age; a large cluster of early Christian sites associated with Columba's missionaries; and evidence of Norse raiders, traders and settlers.

5.6. Ecology and biodiversity

Priority habitats are present across Zone T1 and represent a diverse range of habitats and support a wide variety of species. The zone supports 75% of the UK's priority habitats.[23]

Particularly extensive habitats in Zone T1, as shown in **Figure 5.5** overleaf, include:

- Blanket bogs on the Outer Hebrides (**11**)
- Blanket bogs and wet heaths in Caithness and Sutherland Peatlands (**12**)
- Wet heaths, blanket bogs, and silicious rocky slopes in the Cuillins (**13**)
- Arable land and market gardens in Moray (**14**)
- Blanket bogs, wet heaths, and dry heaths in the Cairngorms (**15**)
- Closed non-Mediterranean dry acid and neutral grassland, Sub-Atlantic fields, and wet heaths in the Inner Hebrides (**16**)

[23] Highland Nature Biodiversity Action Plan 2021-2026

- Closed non-Mediterranean dry acid and neutral grassland, grasslands, wet heaths, and highly artificial coniferous plantations in Argyll and Bute (**17**)
- Wet heaths, dry heaths, blanket bogs, and highly artificial coniferous plantations on the Isle of Arran (**18**)

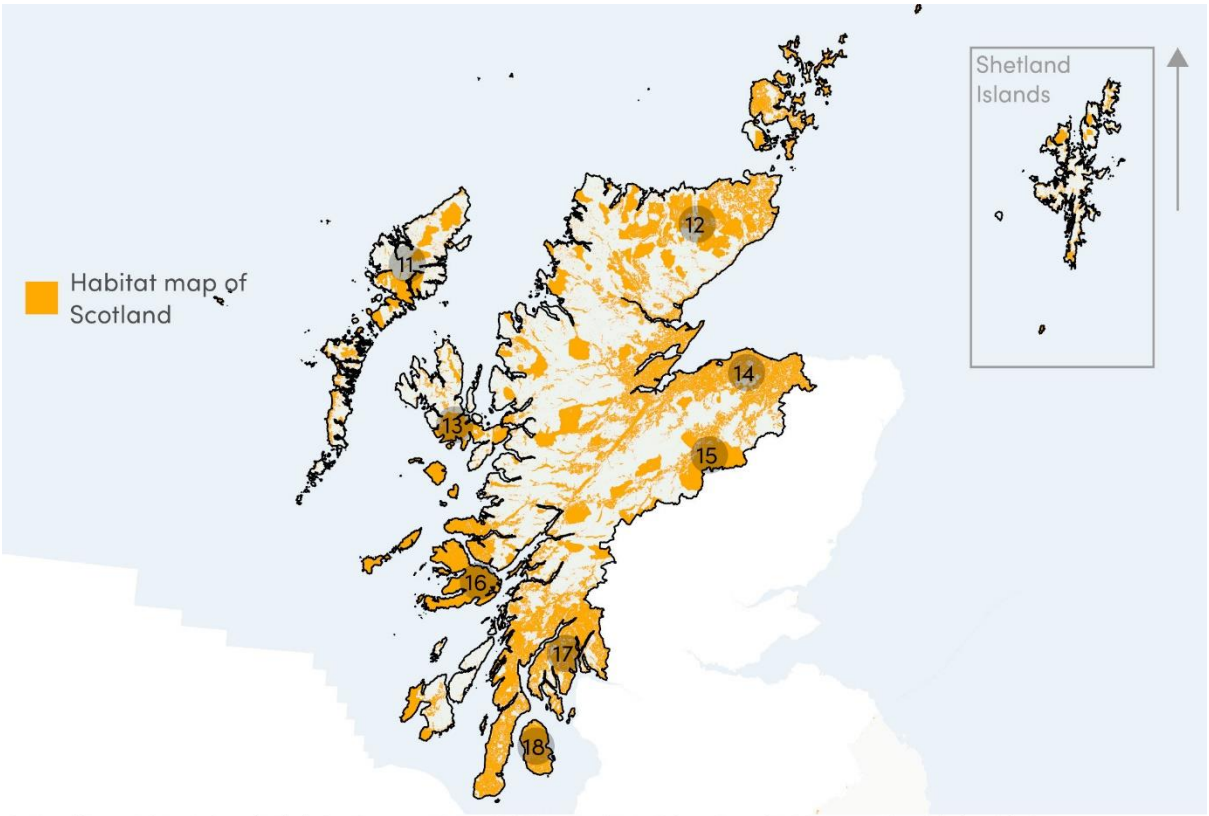

Figure 5.5: Cover of priority habitats in Zone T1

Overall, the area covered by **Special Area of Conservation (SAC)** designations (including possible SACs) is 493,665 ha (11.9% of the zone); the area covered by **Special Protection Area (SPA)** designations (including potential SPAs) is 747,078 ha (18% of the zone); and the area covered by **Ramsar site** designations (including proposed Ramsar sites) is 242,742 ha (5.6% of the zone). Internationally designated sites for biodiversity in Zone T1, as shown in Figure 5.6 overleaf, include:

- The Cairngorms SAC, SPA and Ramsar site (**19**)
- Caithness and Sutherland Peatlands SAC, SPA and Ramsar site (**20**)
- Cuillins SPA (**21**)
- Glen Affric to Strathconon SPA (**22**)
- Glen Etive and Glen Fyne SPA (**23**)
- Lewis Peatlands SAC, SPA and Ramsar site (**24**)
- Moidart and Ardgour SPA (**25**)

The area covered by **Site of Special Scientific Interest (SSSI)** designations is 696,585 ha (16.8% of the zone). Nationally designated sites for biodiversity in Zone T1, as shown in Figure 5.6 overleaf, include:

- The Arran Northern Mountains (**26**)
- Parallel Roads of Lochaber (**27**)
- Ardlair – Letterewe and An Teallach (**28**)
- Ben More Assynt (**29**)
- Ben Klibreck (**30**).

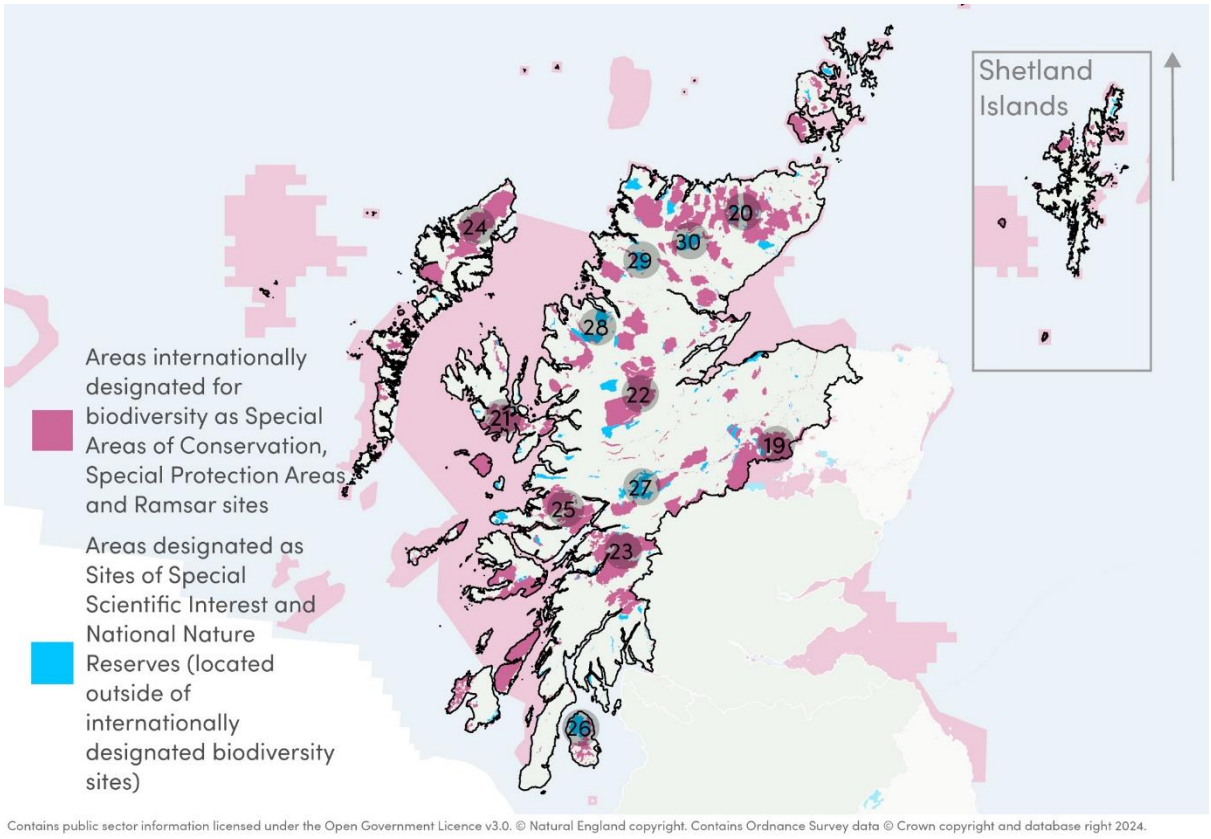

Figure 5.6: Internationally and nationally designated sites for biodiversity in Zone T1

The percentage of the zone covered by **ancient woodland** is 4.5%, totalling 185,384 ha.

5.7. Land and soil resources

In terms of the national scale land capability classification for agriculture, given the majority of this zone is comprised of mountains, uplands and hills, the predominant topography, natural processes and geological characteristics mean that over 60% of the zone is comprised of low quality – **classes 5, 6 and 7** – agricultural land (see Figure 5.7 overleaf). Particular concentrations of poor land (class 7) can be found on the edge of the Cairngorms National Park and more widely across the Highlands. A number of areas in the zone however have higher quality agricultural land quality, including near to Inverness, the Black Isle (**31**) and along the Moray and Cromarty Firth; around the north-eastern tip of the Scottish mainland at Caithness (**32**) where there is some significant amounts low-lying of coastal plain; and along the River Spey (**33**). The agricultural capability of land on the Scottish Islands is mostly poor, with the Orkney Islands showing some slightly better agricultural capability than the Shetland Islands, or the Inner or Outer Hebrides.

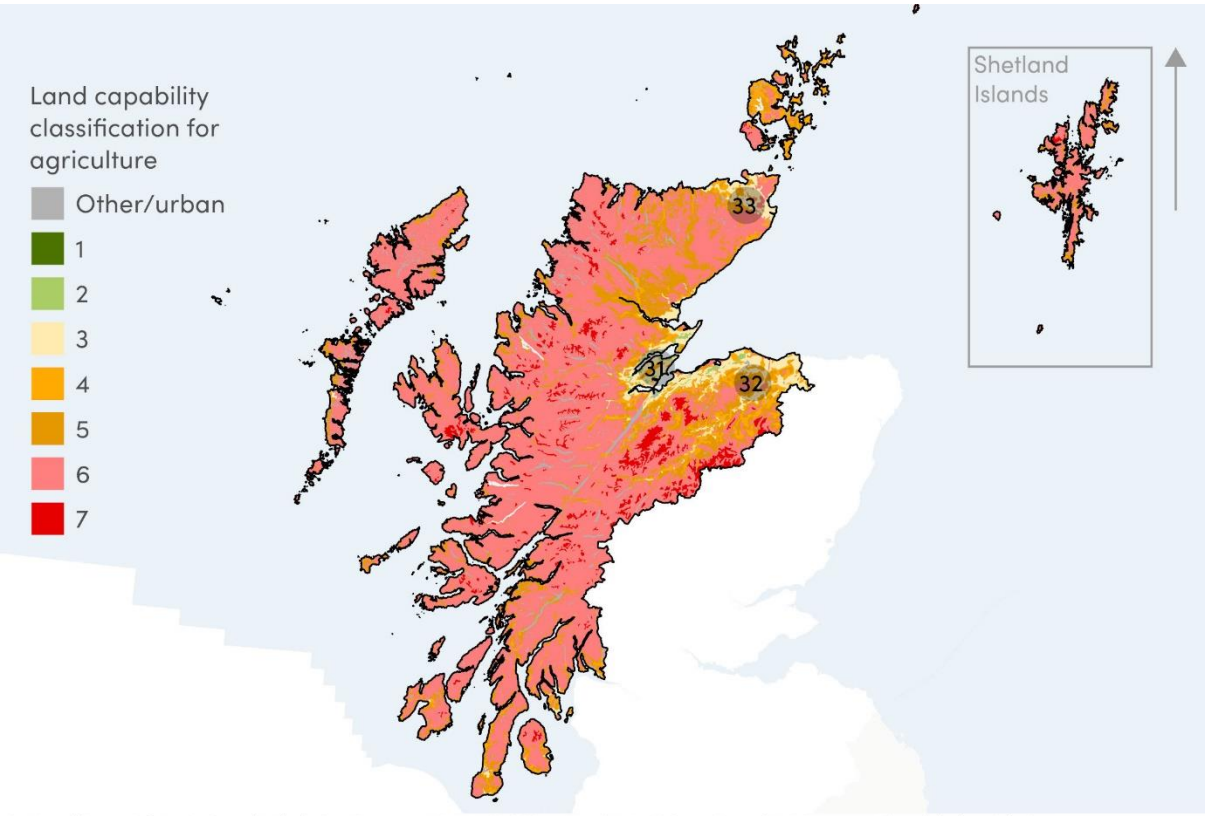

Figure 5.7: ALC across Zone T1

5.8. Landscape and seascape

Zone T1 has a diverse range of **landscapes**, representing a significant breadth of landscape and seascape types which reflect the interplay of the area's topography, geology, biodiversity, land uses and cultural heritage.

The **north-east** of mainland Scotland in Zone T1 is characterised by moorland and flat peatland.[24] The north-east's landscape and seascape is also heavily influenced by many windfarm developments located there, particularly in areas by the coast.[25] The **western, central, and southern** areas of mainland Scotland in Zone T1 are more mountainous in character, with large areas of rugged mountain massif, rugged coastal hills, and rounded hills. The west of Zone T1 is also influenced by the mining industry, with significant extraction areas being Argyll and the North West Highlands. Other influences on Zone T1's landscape and seascape include the fishing industry, with the presence of coastal villages and associated infrastructure (such as fish farms) commonly found along Zone T1's coastline, whilst both coastal and inland areas are also influenced by crofting practices.

In addition to mainland Scotland, Zone T1 includes several groups of islands, each with their own distinct landscapes and seascapes.

[24] NatureScot (2002): Natural Heritage Zones: A National Landscape Assessment of Scotland's Landscapes

[25] The Highland Council (2024): Highland Wind Turbine Mapping – 1 July 2024

Located off Scotland's western coast are the **Inner Hebrides and Outer Hebrides**. The Inner Hebrides contain a range of diverse landscape types, reflecting their diverse geology, ranging from areas of high tops to smooth stepped moorland. The Outer Hebrides are characterised by boggy and rocky moorland, alongside significant areas of mountain massif.

To the north-east of mainland Scotland lie the **Orkney Islands** and the **Shetland Islands**. The Orkney Islands are characterised by mixed agriculture, settlements, and moorland hills. The Island also contains several Neolithic sites, including Skara Brae and the Ring of Brodgar, that are an important part of the local historic landscape. The Shetland Islands are dominated by peatland and moorland, major uplands, and farmland. The Shetland Islands are also home to many archaeological sites tied to the area's Viking history, which also influence the Islands' historic landscape.

A significant proportion of Zone T1 (25.7%) is covered by **National Park** or **National Scenic Area (NSA)** status: the percent of the zone covered by National Parks is 6.3% (262,753 ha); and the percent covered by NSAs is 19.4% (806,940 ha).

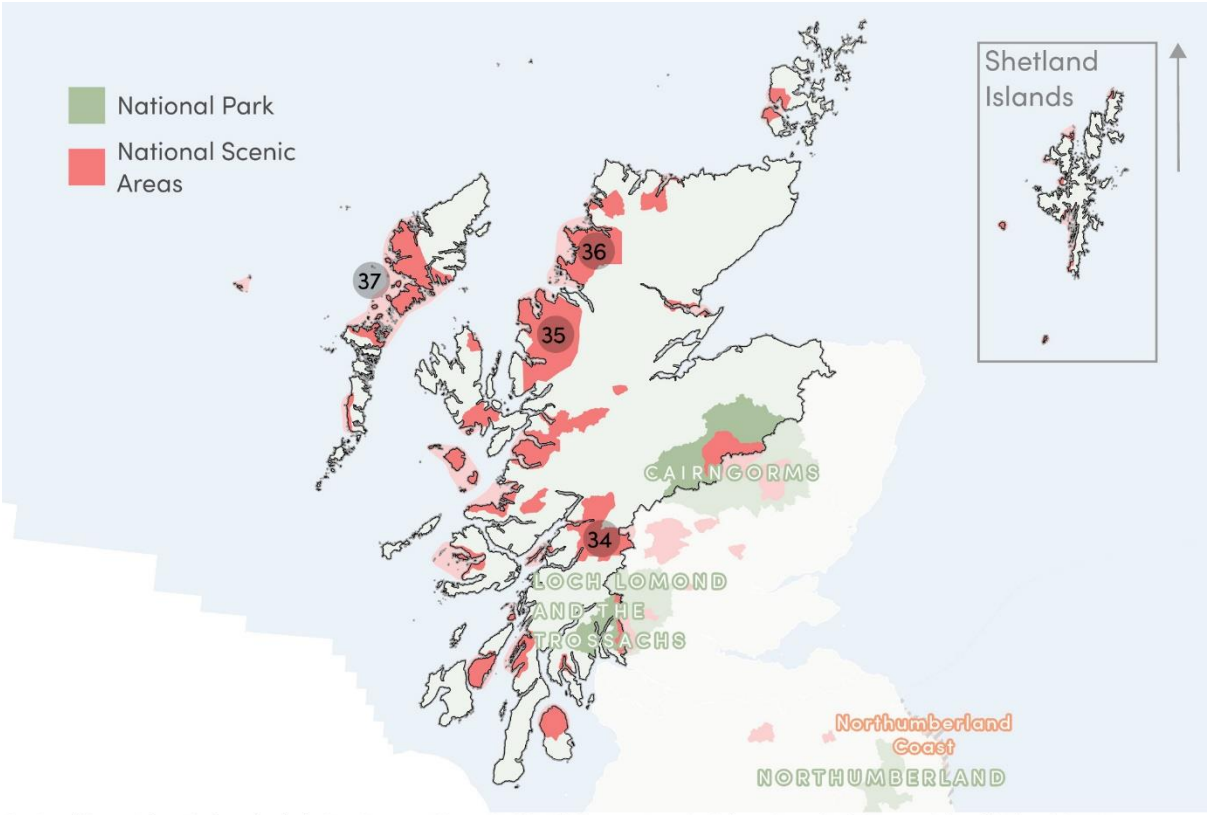

Figure 5.8: Designated landscapes within Zone T1

The **Cairngorms National Park** is an upland National Park in Scotland's Central Highlands, in the Grampian mountain range, located between Perth and Inverness, 127 miles north of Edinburgh and 140 miles north of Glasgow (see Figure 5.8 above). The National Park spans the council areas of Aberdeenshire Council, Angus Council, Moray Council, Perth & Kinross Council and The Highland Council. Its special qualities include wild, high mountains; heather moorlands; ancient woodlands; rivers; tranquillity; an extensive network of public

rights of way; traditional land management practices; and many historic buildings and structures.

Loch Lomond and The Trossachs National Park is located in west-central Scotland, 23 miles north-west of Glasgow and 65 miles west of Edinburgh (see Figure 5.8 above). The National Park is located on the boundary between Scotland's Central Lowlands and the southern edge of the Highlands, offering a diverse mix of lowland and upland landscapes. Its special qualities include rolling lowland landscapes; rugged mountains; lochs; ancient woodlands; tranquillity; an extensive network of public rights of way; traditional land management practices; and many historic buildings and structures.

There are **28 NSAs** located wholly or partly within Zone T1 (see Figure 5.8 above). These are: The Cairngorm Mountains; Ben Nevis and Glen Coe (**34**); Loch Lomond; North Arran; Kyles of Bute; Scarba, Lunga and the Garvellachs; Jura; Knapdale; Lynn of Lorn; Loch na Keal, Isle of Mull; The Small Isles; Loch Shiel; Morar, Moidart and Ardnamurchan; Knoydart; Kintail; Glen Affric; Glen Strathfarrar; The Cuillin Hills; Wester Ross (**35**); Trotternish; Dornoch Firth; Assynt – Coigach (**36**); North - West Sutherland; Kyle of Tongue; Hoy and West Mainland; South Lewis, Harris and North Uist (**37**); South Uist Machair; and St Kilda. The number and range of these National Scenic Areas reflect the rich diversity of the Zone's landscapes and seascapes.

5.9. Water

According to the Water Framework Directive (WFD) river classification data, **19 waterbodies** in Zone T1 are classified as having a **'bad' ecological status**. These are:

- Abhainn Fionain
- Abhainn Mhor a Ghlinne Ruaidh
- Allt a Mhuilinn
- Allt Bhlaraidh
- Allt Bhran
- Allt Cuaich
- Allt Doire Duibhe
- Allt Labhrach
- Allt Laire
- Allt Leachdach
- Allt na Lairige
- Big Burn – Ness confluence to Loch Ashie
- Glascarnoch River – Black Bridge to Loch Glascarnoch
- Lochourn River
- North Glen Sannox
- River Grudie – Bran confluence to Allt a Choin Idhir
- River Lossie – Leanoch Burn to Mosstowie Canal
- River Loyne – River Moriston confluence to Loch Loyne
- River Lundy

The Flood Risk Management Plans that cover Zone T1, and the **Potentially Vulnerable Areas (PVAs)** which fall within the zone, are set out below:

- The **Highland and Argyll** Flood Risk Management Plan 2022 to 2028[26] identifies **30 PVAs** for significant risk of flooding from various sources, all of which fall within Zone T1: Thurso and Halkirk, Wick, Lochinver, Golspie, Dornoch, Aird Point, Gairloch, Tarbat Ness, Invergordon, Alness, Kinlochewe, Garve, Dingwall and Strathpeffer, Conon Bridge, Muir of Ord and Maryburgh, Ardersier, Smithton and Culloden, Inverness, Drumnadrochit, Fort Augustus, Fort William to Corpach, Ballachulish and Glencoe, Oban, Inveraray, Lochgilphead, Tarbert, Clachan, Campbelltown, Taynuilt, Avoch, and Beauly. Currently it is estimated that there are 22,000 people and 15,000 homes and businesses at risk from flooding. This is estimated to increase to 34,000 people and 23,000 homes and business by the 2080s due to climate change.
- The **Findhorn, Nairn and Speyside** Flood Risk Management Plan 2022 to 2028[27] identifies **15 PVAs** for significant risk of flooding from various sources, all of which fall within Zone T1: Burghead to Lossiemouth, Spynie, Lhanbryde, Kingston and Garmouth, Elgin, Forres, Dallas, Nairn, Rothes and Aberlour, Aviemore, Kingussie, Newtonmore, Dalwhinnie, Kinloss, and Nethy Bridge. Currently it is estimated that there are 11,000 people and 7,300 homes and businesses at risk from flooding. This is estimated to increase to 15,000 people and 9,900 homes and business by the 2080s due to climate change.
- The **Orkney** Flood Risk Management Plan 2022 to 2028[28] identifies **eight PVAs** for significant risk of flooding from various sources, all of which fall within Zone T1: Sanday, Stronsay, Westray, Stromness and Stenness, Kirkwall, Hoy and South Walls, South Ronaldsay, and Burray and the Churchill Barriers. Currently it is estimated that there are 2,300 people and 1,900 homes and businesses at risk from flooding. This is estimated to increase to 2,700 people and 2,200 homes and business by the 2080s due to climate change.
- The **Outer Hebrides** Flood Risk Management Plan 2022 to 2028[29] identifies **five PVAs** for significant risk of flooding from various sources, all of which fall within Zone T1: Stornoway, North Uist, Benbecula, South Uist, and Barra. Currently it is estimated that there are 980 people and 820 homes and business at risk from flooding. This is estimated to increase to 1,500 people and 1,200 homes and businesses by the 2080s due to climate change.
- The **Shetland** Flood Risk Management Plan 2022 to 2028[30] identifies **four PVAs** for significant risk of flooding from various sources, all of which fall within Zone T1: Shetland North Mainland, Shetland West Mainland, Shetland Central and South Mainland, and Yell. Currently it is estimated that there are 210 people and 230 homes and businesses at risk from flooding. This is estimated to increase to 300 people and 300 homes and business by the 2080s due to climate change.
- The **Clyde & Loch Lomond** Flood Risk Management Plan 2022 to 2028[31] identifies 23 PVAs for significant risk of flooding from various sources; **two PVAs** fall within Zone T1:

[26] Scottish Environment Protection Agency (2022): Highland and Argyll Flood Risk Management Plan
[27] Scottish Environment Protection Agency (2022): Findhorn, Nairn and Speyside Flood Risk Management Plan
[28] Scottish Environment Protection Agency (2022): Orkney Flood Risk Management Plan
[29] Scottish Environment Protection Agency (2022): Outer Hebrides Flood Risk Management Plan
[30] Scottish Environment Protection Agency (2022): Shetland Flood Risk Management Plan
[31] Scottish Environment Protection Agency (2022): Clyde & Loch Lomond Flood Risk Management Plan

Dunoon, and Isle of Bute. Currently it is estimated that there are 170,000 people and 98,000 homes and businesses at risk from flooding. This is estimated to increase to 220,000 people and 130,000 homes and business by the 2080s due to climate change.

Flood risk areas in Zone T1 are shown in Figure 5.9 overleaf.

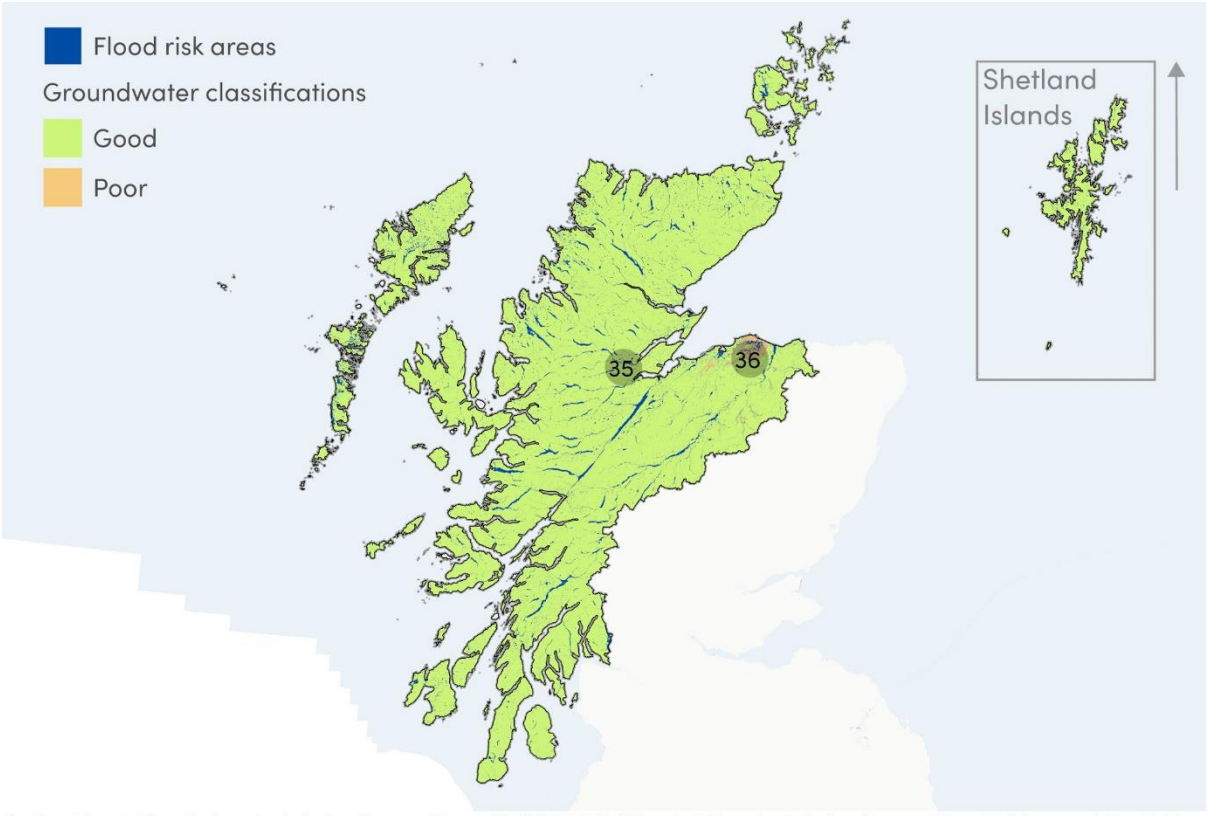

Figure 5.9: Flood risk areas within Zone T1

Groundwater conditions are classified as poor in the vicinity of Inverness (**35**), Elgin and Charlestown (**36**) (see Figure 5.9 above).

5.10. Key issues for Zone T1

The following key issues of relevance for the SSEP have been identified through the review of the baseline information for Zone T1:

- The zone has a key role in **carbon storage**, including nationally important carbon-rich soils, deep peat and priority peatland habitat.
- **Sea level rise** is offsetting isostatic uplift in the zone, with implications for coastal change.
- The Highlands and Islands has an **ageing population**.
- Whilst deprivation as a whole is lower than many other parts of Scotland, there are **pockets of deprivation** across the zone. Accessibility to services, facilities and employment opportunities is also a key issue across the zone.

- The zone has a rich and diverse **historic environment** representing the historic evolution of the Highlands and Islands. This has left significant legacies across the zone, including in its landscape, culture and economy.
- The zone has a rich **archaeological resource**.
- **Gaelic** is spoken by around 65,000 people; whilst it is strongest in the Western Isles there are substantial Gaelic communities elsewhere in the Highlands & Islands. The Gaelic culture is currently enjoying a revival, and central to supporting this revival have been developments in education and in promoting Gaelic culture.
- The zone contains a wide range of **habitats**, supporting 75% of the UK's priority habitats. A large proportion of the zone has been designated under international and national biodiversity designations. This includes a significant proportion of its coastline.
- The dual challenges of climate change and the ecological emergency are having a significant effect on the zone's habitats and species. The zone has significant opportunities for **habitat enhancement**.
- Key areas of higher quality **agricultural land** include in the vicinity of the Moray and Cromarty Firth, Caithness and along the River Spey.
- The zone has a diverse range of **landscapes**, representing a significant breadth of landscape and seascape types which reflect the interplay of the area's topography, geology, biodiversity, land uses and cultural heritage. Reflecting its high-quality landscape and seascape, there are two National Parks and 28 National Scenic Areas present in the zone.
- **19 waterbodies** in Zone T1 are classified as having a **'bad' ecological status**.
- The zone has a number of locations at risk of **flooding** from various sources.

6. Zone T2: North Eastern Scotland

Overview of Zone T2

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for T2

6.1. Overview of Zone T2

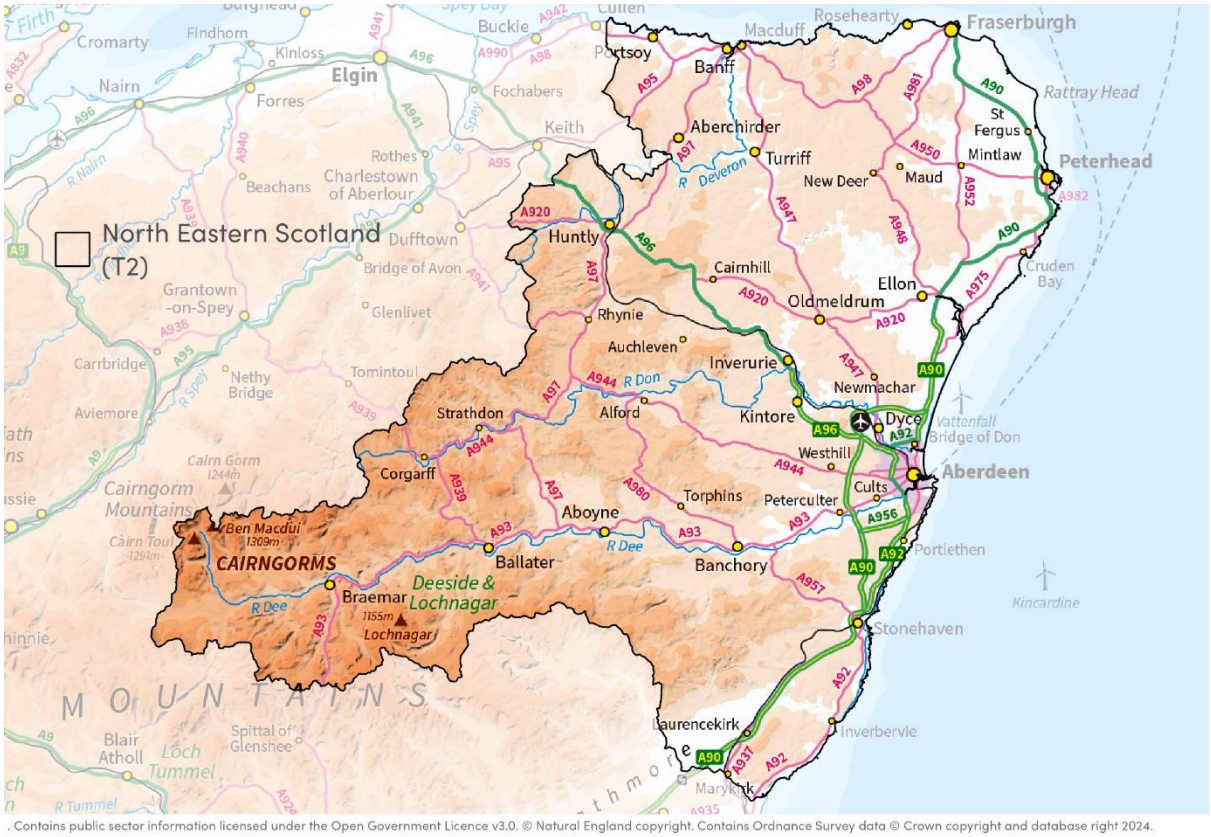

Figure 6.1: Area covered by Zone T2 – North Eastern Scotland

Zone T2 comprises the North Eastern region of Scotland.

Zone T2 covers an area of **6,504 km²** (see Figure 6.1 above) and has a population of approximately **490,000** (2022). The area is predominantly rural, though it includes the major urban centre of Aberdeen as well as towns such as Peterhead, Fraserburgh and Banff.

Aberdeen serves as a major hub for the oil and gas industry, as well as increasingly playing a prominent role in the offshore wind sector. Fraserburgh and Peterhead play an important role in Scotland's fishing industry, with key ports found in both towns.

The landscapes in the south west of the zone are considered to be of high value, with two NSAs and the Cairngorms National Park, all designated for their mountainous topography and associated natural features.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

6.2. Air quality

Air quality issues in the zone are largely associated with traffic and transport. The **three AQMAs** in the zone are all located within Aberdeen (**1**) (see Figure 6.2 below) and have designated for exceedances in the annual mean concentration objective of 40µg/m^3 for NO_2 and particulate matter (PM_{10}). The Aberdeen City Centre AQMA and the Wellington Road AQMA are also designated for exceedances in the 24 hour mean concentration objective of 50µg/m^3 for PM_{10} – also linked to traffic emissions.[32]

Figure 6.2: AQMAs in Zone T2

6.3. Climate change

In this zone, total GHG emissions amounted to **4,765.6 kt CO_2e** in 2022. The largest contributor to this total was the **agricultural sector** (approx. 28.9%), followed by the transport sector (approx. 23.1%) and then the domestic sector (approx. 18.5%)[33].

The zone has a good level of **carbon storage potential**. For example the Scottish Government supports a number of carbon capture and storage projects in the zone, including the Acorn Transport and Storage Project and the Scottish Cluster, which is located within Aberdeenshire. This intends to capture carbon dioxide from industrial

[32] Aberdeen City Council (2024): Annual Progress Report (APR)
[33] UK Government (2022): UK local authority and regional greenhouse gas emissions statistics

emissions, with it being transported by pipeline to Acorn, and then onwards to be stored permanently under the North Sea in depleted oil and gas wells[34].

Primary impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections (UKCP18)[35], winters in Scotland are anticipated to be 1.24°C warmer between 2021-2040 and 2.8°C warmer between 2061-2080 in comparison to 1981-2000 (1.8°C). Warmer summers are also anticipated - with a 1.72°C increase anticipated for 2021-2040, and a 4°C increase for 2061-2080 in comparison to 1981-2000 (11.89°C). Winters in Scotland are anticipated to be wetter (increasing to 6.5mm/day in 2061-2080 in comparison to 5.82mm/day in 1981-2000), and drier in the summer (decreasing to 3.27mm/day in 2061-2080 in comparison to 3.93mm/day in 1981-2000)[36]. This zone is at risk of coastal change, which is likely to be exacerbated by climate change.

Secondary impacts from climate change are largely linked to changes in temperature, humidity and precipitation. These can be widespread and impact upon ecosystems, people, settlements and infrastructure. Changes in precipitation patterns can lead to an increase in flood events or the occurrence of drought, which can impact on agriculture and natural resources. Increased temperatures can also result in heat-related human mortality, and cause species loss. Additionally, higher temperatures and the occurrence of heatwaves can aggravate air pollution events and also limit the function of key infrastructure – including compromising energy systems. The Intergovernmental Panel on Climate Change (IPCC) outlines that the energy sector is climate-exposed, indicating that energy infrastructure will become increasingly vulnerable if design standards do not account for changing climate conditions[37]. Infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems are viewed as the most feasible adaptation techniques – alongside energy generation diversification (i.e., a greater use of renewable energy)[38].

6.4. Community wellbeing

The population of North Eastern Scotland is **487,744** (Scottish Census 2022). The population density of the zone varies substantially with a density of 1207.1 residents per square km in the Aberdeen City local authority area and averaging 41.8 across the Aberdeenshire area.

The age profile in North Eastern Scotland is similar to the Scottish average (see Figure 6.3 overleaf). Most of the population (63.6%) falls within the **working age** bands, with 17.2% of

[34] Scottish Government (no date): Carbon capture, utilisation and storage
[35] Met Office (no date): UKCP data
[36] Based on the RCP8.5 emissions scenario, which assumes there is fast population growth, low technical development rate, slow GDP growth, a massive increase in world poverty and high energy use and emissions. It also assumes no climate change mitigation or adaptation techniques are engaged with.
[37] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[38] IPCC (2019): Climate Change and Land

the population aged 15 and under and 19.2% aged over 65 (Scottish Census 2022).

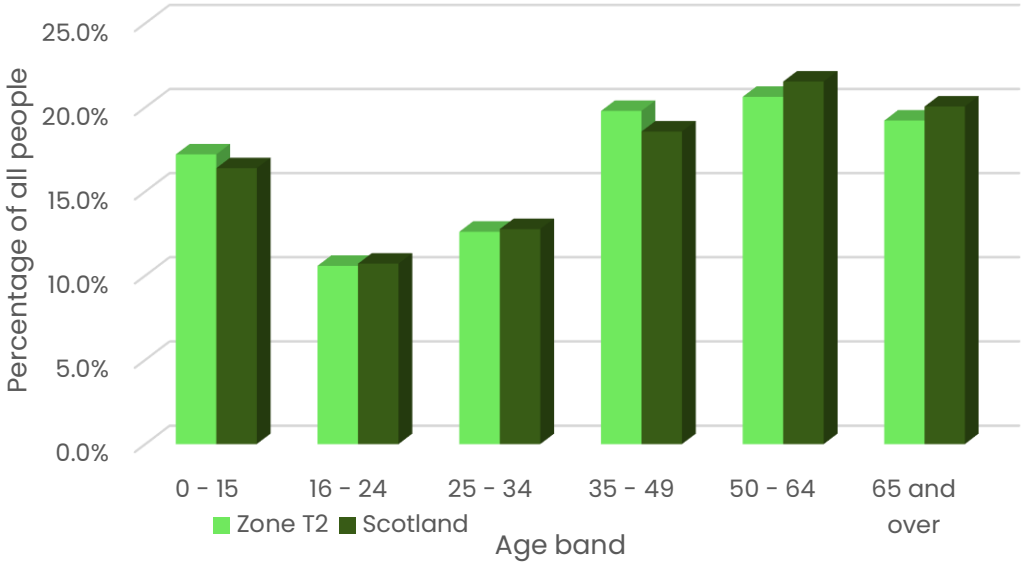

Figure 6.3: Age profile of Zone T2 (source Scottish Census 2022)

IMD data from 2019 shows that this zone has **lower levels of deprivation** compared to other zones in Scotland, including large communities with the lowest levels of deprivation in Scotland, in particular in and nearby Aberdeen. However, pockets of deprivation in the zone exist to the north and east of Aberdeen, and in Peterhead and Fraserburgh.

Key **'traditional' economic sectors** in the zone include agriculture, fishing and oil and gas production. The zone includes operations for offshore oil and gas production for numerous energy companies. Recently, the zone has also seen an increase in renewable energy generation, particularly offshore wind and marine energy generation, and has become a centre for the nascent carbon capture industry.

In Zone T2, the industries with the **highest regional GVA in 2022**[39] were the services sector and production sector.

The **fishing industry** is a key economic sector for North Eastern Scotland, with Peterhead being the single largest fishing port in the UK by tonnage and value of landing and one of the busiest in Europe. 181,227 tonnes of fish were landed in 2023.[40] The port is known for its whitefish, including haddock, cod, and whiting, as well as shellfish, such as crab and lobster. Fraserburgh is another key fishing port, with 16,262 tonnes of fish landed in 2023, and is known for its haddock, cod, and whiting, as well as langoustine and crab.[41]

The region has an excellent **rights of way network**, some of which provide for nature-based recreation, leisure and tourism. The zone includes the 166km Aberdeenshire Coastal Trail between St Cyrus and Portsoy and the 86km Formartine and Buchan Way. The Scottish National Trail also intersects the zone near Cairngorms.

[39] ONS (2024): Regional gross value added (balanced) by industry: all ITL regions
[40] Scottish Sea Fisheries Statistics 2023
[41] Scottish Sea Fisheries Statistics 2023

6.5. Cultural heritage and historic environment

Zone T2 has a rich **historic environment** and cultural heritage resource. The distribution and diversity of heritage features in the zone reflect the historic evolution of the region from prehistoric times, incorporating:

- Bronze Age settlement.
- The decline of climate conditions and development of Iron Age hillforts.
- The rise of tribal Pictish kingdoms between 200 CE and 900 CE.
- Transformation of these kingdoms under the Scottish kings and Anglo-Norman incursions.
- A history of war, rebellion, uprising and occupation during the Wars of Scottish Independence and subsequent conflicts up to the 18th century.
- The development of the great agricultural estates in Aberdeenshire.
- The expansion of fishing communities and port activities along the coast.

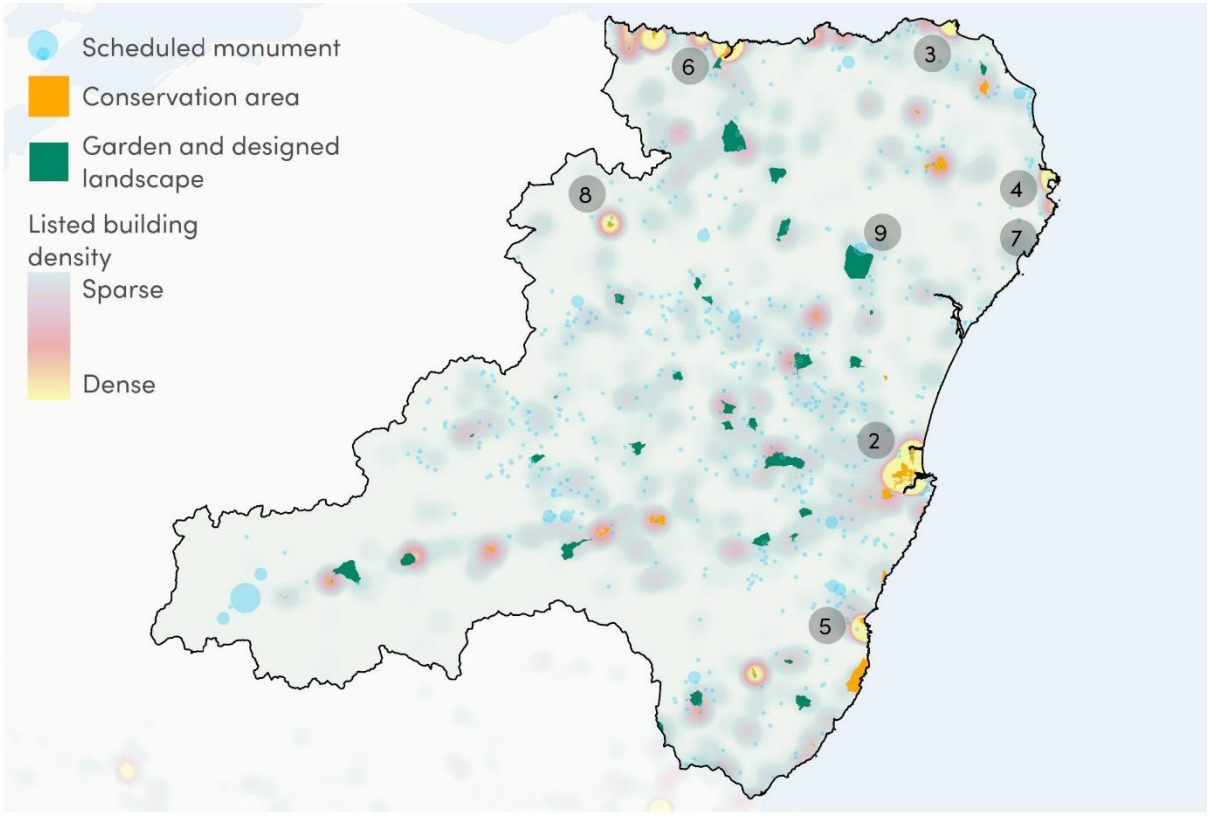

Figure 6.4: Designated heritage assets within Zone T2

Concentrations of historic environment designations in the zone are shown in Figure 6.4 above and include (but are not limited to):

- **Aberdeen** (**2**): Reflecting its growth subsequent to the development of New Aberdeen by David I in the 12th century and the granting of the Great Charter of Robert the Bruce in 1319; its role in the Wars of Scottish Independence and the later Wars of the Three Kingdoms; development of civic infrastructure in the 18th century; and the expansion of

the city and the harbour in the 19th century, reflecting the increasing economic importance of the city and the development of the shipbuilding and fishing industries.
- **Fraserburgh** (**3**), **Peterhead** (**4**) and **Stonehaven** (**5**): Linked to the towns' rich maritime and fishing heritage.
- **Banff, MacDuff and Whitehills** (**6**): With some of the best-preserved townscapes in Scotland, the historic environment is closely linked to Banff's granting of a royal burgh in the 12th century, its role as a Hanseatic trading town, its development as a centre of trade, weaving, and silver-making, and its subsequent development as a fashionable 18th-century resort town.

Zone T2 has a rich **archaeological resource**. It is a locus of a large number of Neolithic and Bronze Age archaeological sites, including Longman Hill, Kempstone Hill, Catto Long Barrow and Cairn Lee. There are also a significant number of Iron Age hillforts, and a range of defensive structures dating from the medieval and early modern period, such as the prominent examples of Dunnottar Castle (**5**), Slains Castle (**7**), and Huntly Castle (**8**).

The zone has numerous **gardens and designed landscapes**. This reflects the agricultural affluence of Aberdeenshire, which has lent itself to a prevalence of a large number of prominent agricultural estates in the area. Examples include Haddo House (**9**), Forglen, Duff House and Leith House.

6.6. Ecology and biodiversity

Priority habitats are present across Zone T2 and represent a diverse range of habitats and support a wide variety of species.

Particularly extensive habitats in Zone T1, as shown in Figure 6.5 overleaf, include:

- Blanket bogs, wet heaths, and dry heaths in the Cairngorms (**10**)
- Caledonian forest, juniper-wood sorel woodland, woodland not on marshy terrain, dry heaths, and wet heaths in Glen Tanar (**11**)
- Arable land and market gardens across much of the zone (**12**)

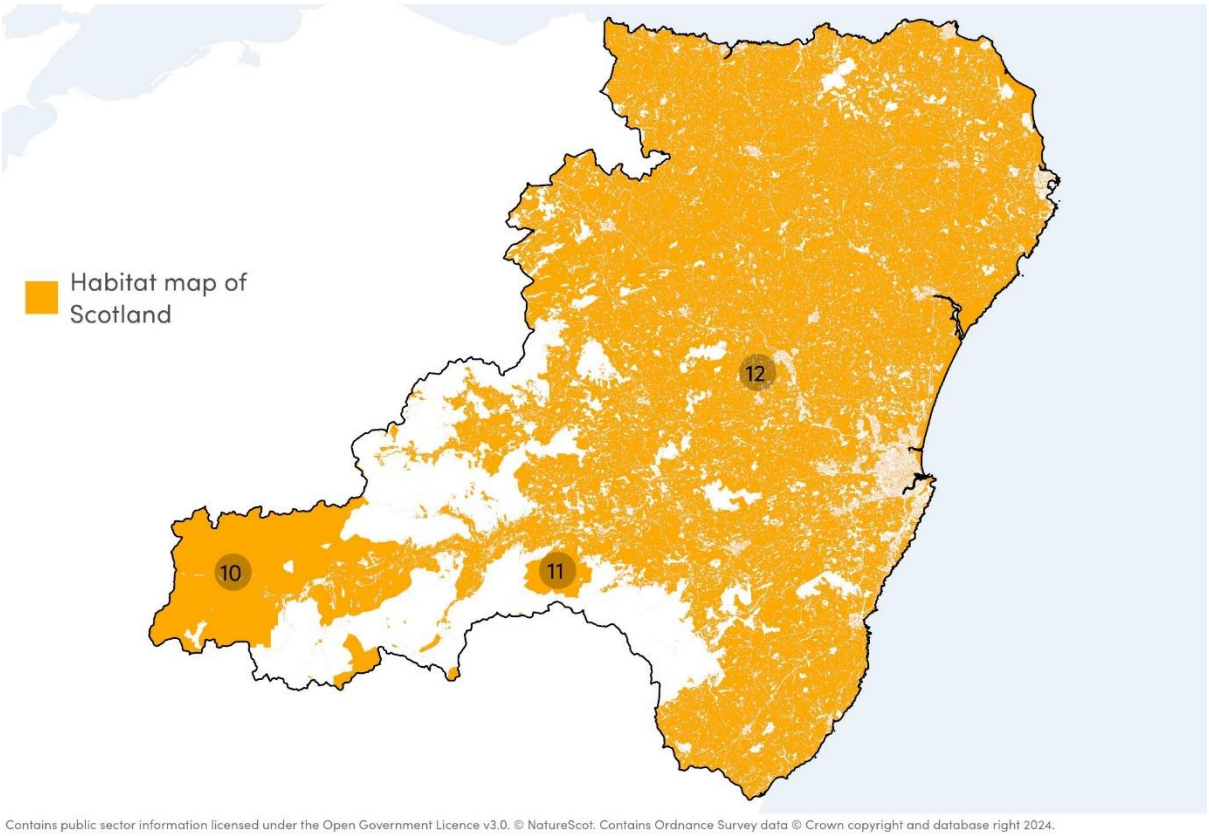

Figure 6.5: Cover of priority habitats in Zone T2

Overall, the area covered by **SAC** designations (including possible SACs) is 35,174 ha, (5.4% of the zone); the area covered by **SPA** designations (including potential SPAs) is 103,664 ha (16% of the zone); and the area covered by **Ramsar site** designations (including proposed Ramsar sites) is 1,009 ha (0.16% of the zone). The area covered by **SSSI** designations is 40,578 ha (6.3% of the zone).

Internationally designated sites for biodiversity in Zone T2, as shown in Figure 6.6 overleaf, include:

- The Cairngorms SAC, SPA and Ramsar site (**13**)
- Ladder Hills SAC (**14**)
- Hill of Towanreef SAC (**15**)
- Loch of Strathbeg SPA and Ramsar site (**16**)
- Sandcs of Forvie SAC / Ythan Estuary, Sands of Forvie and Meikle Loch SPA (**17**)

The area covered by **SSSI** designations is 40,578 ha (6.3% of the zone). Nationally designated sites for biodiversity in Zone T2, as shown in **Figure 6.6** overleaf, include:

- The Cairngorms SSSI (**13**)
- Morven and Mullachdubh SSSI (**18**)
- Muir of Dinnet SSSI (**19**)
- Ladder Hills SSSI (**14**)
- Hill of Towanreef SSSI (**15**)
- Tore of Troup SSSI (**20**)

- Sands of Forvie and Ythan Estuary SSSI / Forvie NNR (**17**)

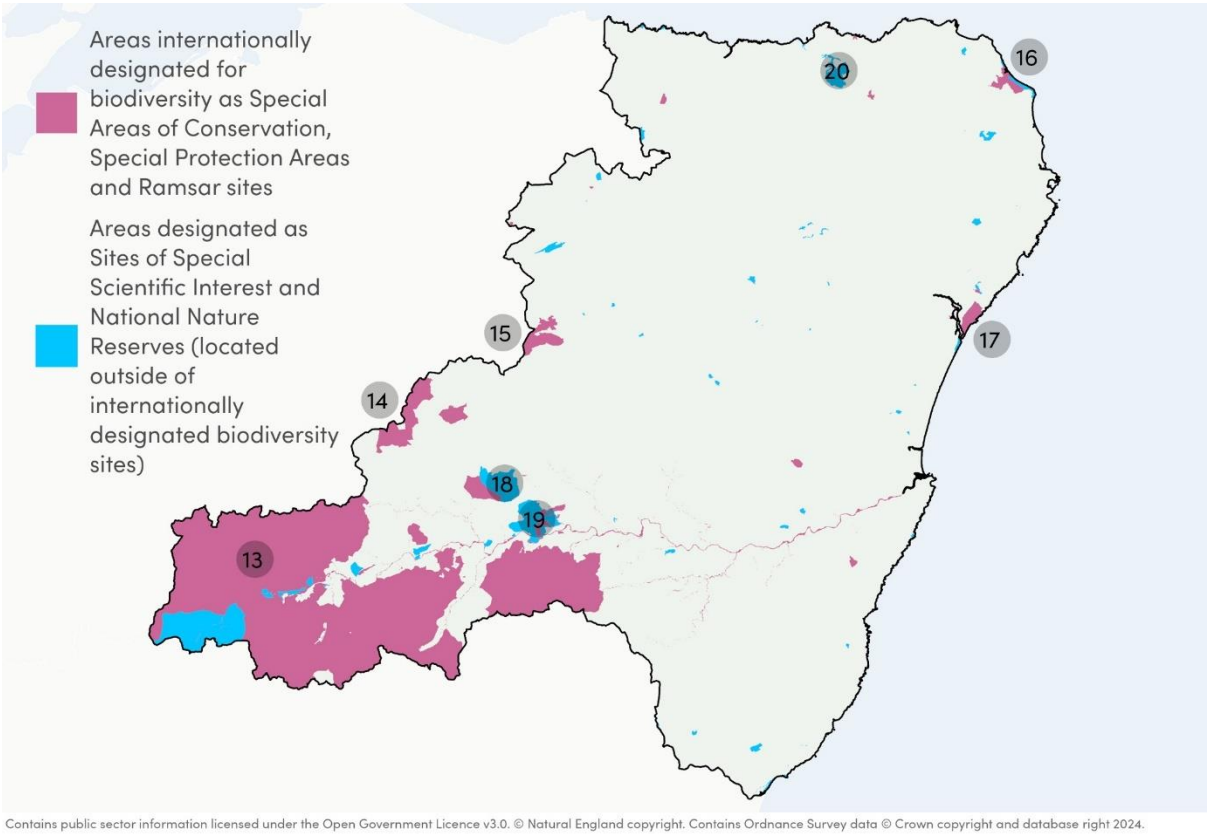

Figure 6.6: Internationally and nationally designated sites for biodiversity in Zone T2

The percentage of the zone covered by **ancient woodland** is 7.4%, totalling **48,119 ha**.

6.7. Land and soil resources

In terms of the national scale land capability classification for agriculture, just 1.6% of the zone is comprised of **class 2** (high quality) land or above, which is largely found in the south of the zone around **Brechin** (**21**). However, large areas of the zone are covered by **class 3** (high to average quality) land (see Figure 6.7 overleaf). As such food, drink and agriculture are a significant part of North East Scotland's economy, with more than 22,000 people employed in the sector.

The zone accounts for less than 12% of Scotland's agricultural area but produces over 20% of Scotland's agricultural output. For specific sectors of agriculture the north east has high shares of activity:

- 33% of cereals
- 29% of beef cattle
- 57% of pigs
- 32% of oilseed rape
- over 33% of Scotland's beef cattle

- 60% of Scotland's malting barley.[42]

The most significant areas of lower class, poorer land which would be unsuitable for most productive agricultural uses are found in the south west of the zone, around the **Cairngorms** mountains, upland and hills (**22**).

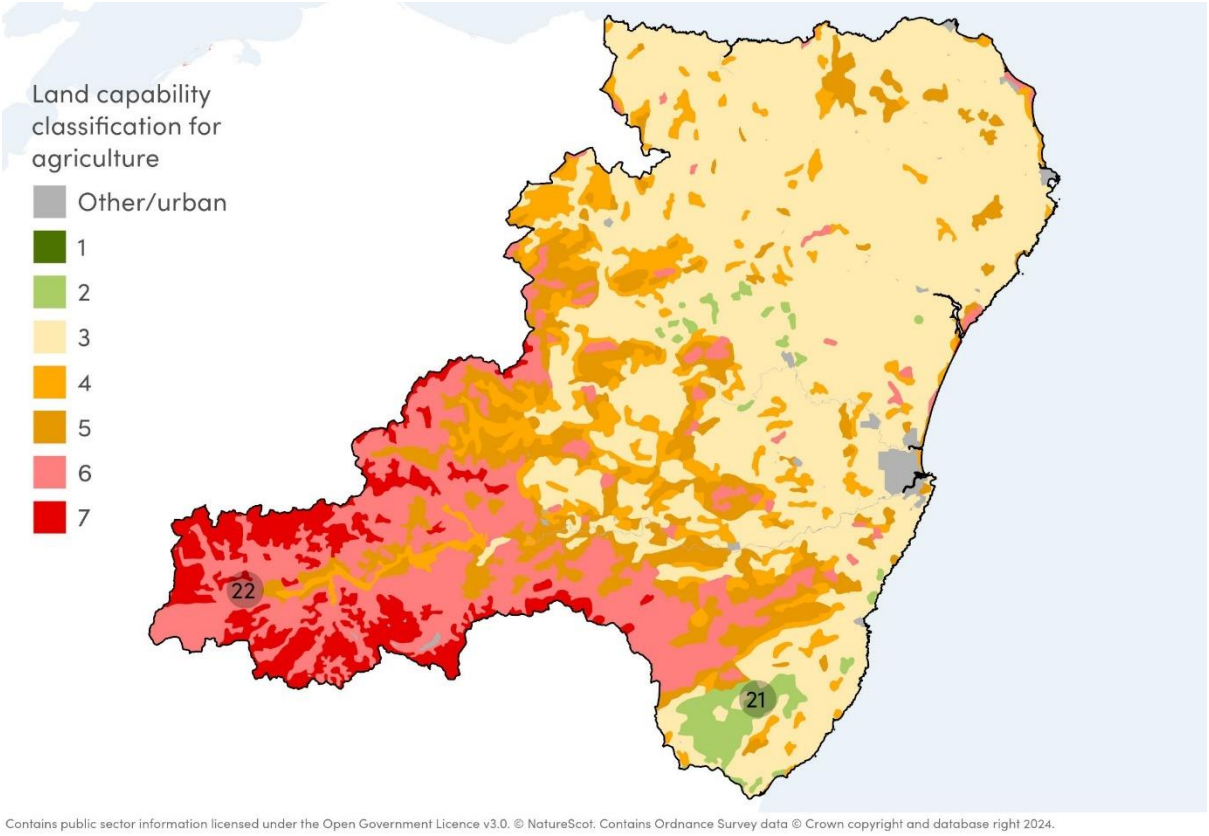

Figure 6.7: ALC across Zone T2

6.8. Landscape and seascape

Zone T2 has a diverse range of landscapes, representing a significant breadth of landscape and seascape types which reflect the interplay of the area's topography, geology, biodiversity, land uses and cultural heritage.

The majority of Zone T2's landscape and seascape is influenced by **agricultural practices** such as the cultivation of crops and livestock grazing, with the central and eastern areas being dominated by agricultural heartlands and coastal farmland.[43] **Whisky production** is also common, with barley fields and distilleries set against the backdrop of the hills and rivers. Along the coastline, the **fishing industry** has also shaped the seascape, with harbours, fishing villages, and associated infrastructure marking the coastline. The seaport city of Aberdeen is also located on the eastern coast.

[42] Aberdeenshire Council (no date): Agriculture and rural development
[43] NatureScot (2002): Natural Heritage Zones: A National Landscape Assessment of Scotland's Landscapes

In Zone T2's western extent, where the Cairngorms mountain range begins, the topography becomes more dramatic, with large areas of **uplands and glens**, and **highland summits** and **plateaux**.

A significant proportion of Zone T2 (30.2%) is covered by National Park or NSA status: the percent of the zone covered by National Parks is 22.3% (114,886 ha); and the percent covered by NSAs is 7.9% (51,087 ha).

The **Cairngorms National Park** (see Figure 6.8 overleaf) is an upland National Park in Scotland's Central Highlands, in the Grampian mountain range, located between Perth and Inverness, 127 miles north of Edinburgh and 140 miles north of Glasgow. The National Park spans the council areas of Aberdeenshire Council, Angus Council, Moray Council, Perth & Kinross Council and The Highland Council. Its special qualities include wild, high mountains; heather moorlands; ancient woodlands; rivers; tranquillity; an extensive network of public rights of way; traditional land management practices; and many historic buildings and structures.

Two NSAs (see Figure 6.8 overleaf) are located wholly or partly within Zone T2. These are the inland landscapes of **Cairngorm Mountains** (**23**) and **Deeside and Lochnagar** (**24**). The Cairngorm Mountains NSA is known for its rugged peaks and wild landscapes, including mountains like Cairn Gorm and Ben Macdui, found at the heart of Cairngorms National Park. The Deeside and Lochnagar National Scenic Area features the River Dee, Ballochbuie Forest, and Lochnagar mountain, overlapping with the National Park's central-eastern section.

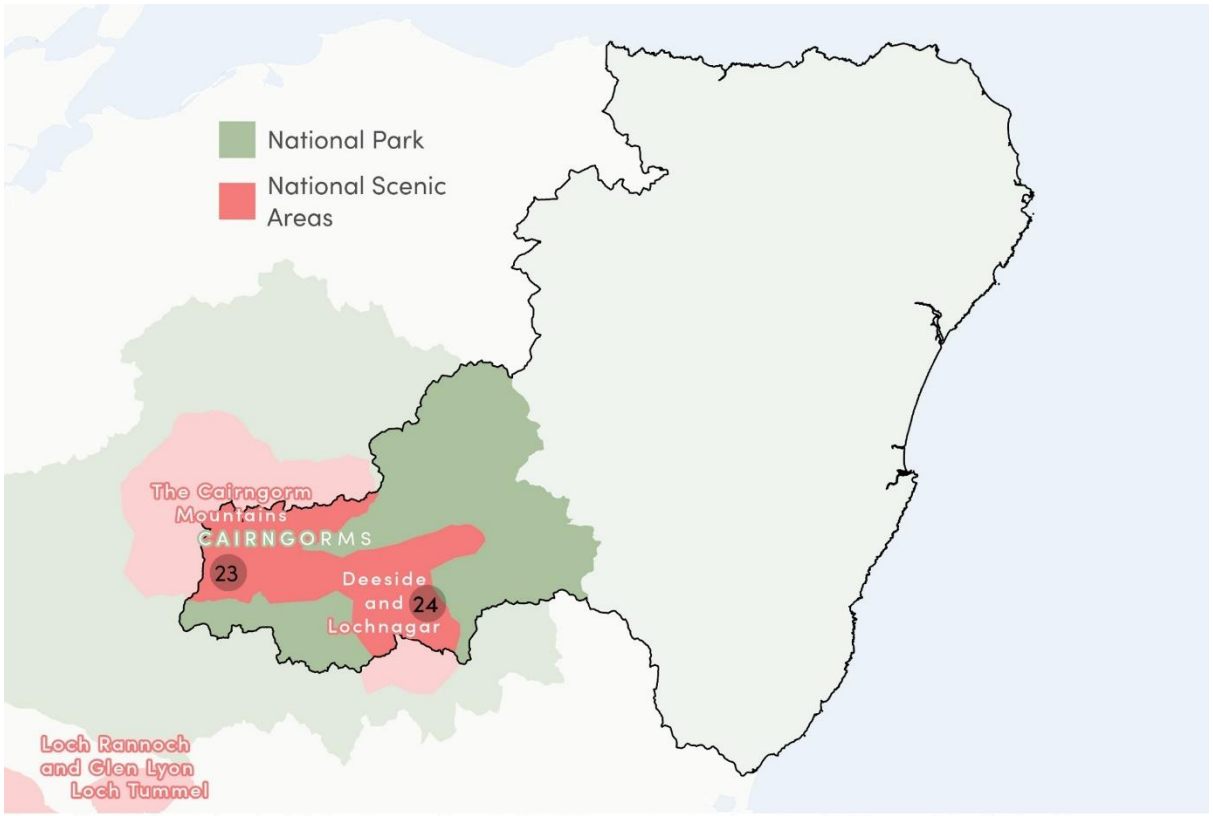

Figure 6.8: Designated landscapes within Zone T2

6.9. Water

According to the WFD river classification data, **two waterbodies** in Zone T2 are classified as having a **'bad' ecological status**. These are:

- Crichie Burn
- River Don – Dyce to tidal limit

The Flood Risk Management Plans that cover Zone T2, and the PVAs which fall within the zone, are set out below:

- The **North East** Flood Risk Management Plan 2022 to 2028[44] identifies **26 PVAs** for significant risk of flooding from various sources: Portgordon and Buckie, Portsoy, Banff and Whitehills, Macduff, Fraserburgh and Rosehearty, Keither and Newmill, Turriff, Peterhead, Methlick, Huntly, Insch, Ellon, Inverurie and Kintore, Newburgh, Aberdeen City – North, Kemnay, Westhill, Aberdeen City – South, Peterculter, Aboyne, Banchory, Ballater, Stonrhaven, Portlethen, Cove and Nigg Bay, and Cruden Bay. Currently it is estimated that there are 51,000 people and 30,000 homes and businesses at risk of flooding. This is estimated to increase to 64,000 people and 38,000 homes and business by the 2080s due to climate change.

[44] Scottish Environment Protection Agency (2022): North East Flood Risk Management Plan

- The **Tay Estuary & Montrose Basin** Flood Risk Management Plan 2022 to 2028[45] identifies 15 PVAs for significant risk of flooding from various sources; **three PVAs** are in this zone: Auchenblae, Fettercairn, and Marykirk. Currently it is estimated that there are 21,000 people and 14,000 homes and businesses at risk from flooding. This is estimated to increase to 29,000 people and 19,000 homes and business by the 2080s due to climate change.

Flood risk areas in Zone T2 are shown in Figure 6.9 below.

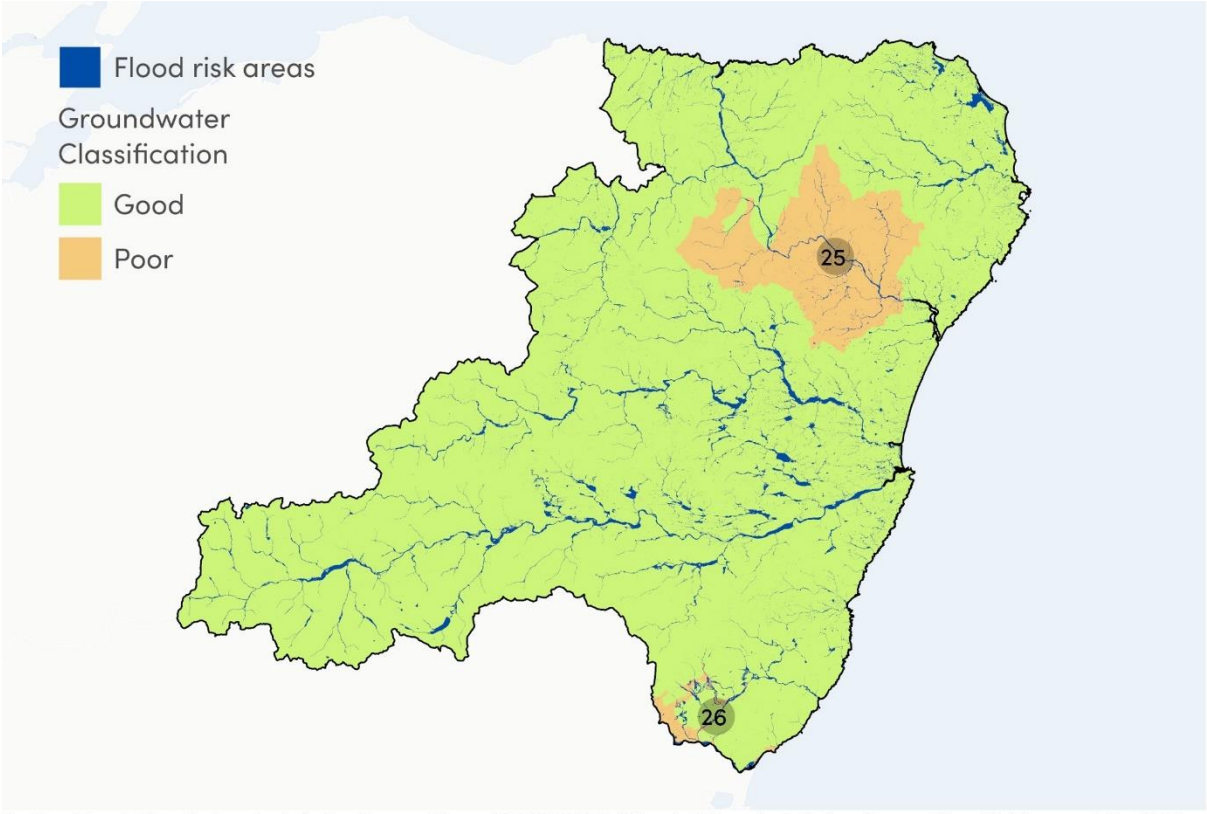

Figure 6.9: Low flood risk areas within Zone T2

Groundwater conditions are classified as poor in the vicinity of Turriff and Ellon (**25**) and Laurencekirk (**26**) (see Figure 6.9 above).

6.10. Key issues for Zone T2

The following key issues have been identified through the review of the baseline information for Zone T2:

- Given the existence of oil and gas infrastructure, and its likely future decommissioning, the zone has significant potential relating to **carbon capture and storage**.
- The zone offers significant opportunities relating to **renewable energy** provision, particularly offshore wind and marine energy generation.

[45] Scottish Environment Protection Agency (2022): Tay Estuary & Montrose Basin Flood Risk Management Plan

- The zone has numerous gardens and designed **landscapes**. This reflects the agricultural affluence of Aberdeenshire, which has lent itself to a prevalence of a large number of prominent agricultural estates in the area.
- The zone has large concentrations of priority habitat and numerous areas internationally and nationally designated for their **biodiversity** value. This includes many locations on the coast.
- The zone produces over 20% of Scotland's agricultural output. Food, drink and **agriculture** are a significant part of North East Scotland's economy, with more than 22,000 people employed in the sector.
- The **fishing industry** is a key economic sector for North Eastern Scotland, with Peterhead being the single largest fishing port in the UK by tonnage and value of landing and one of the busiest in Europe. Fraserburgh is also an important fishing port in the zone.
- The south west of the zone contains the **Cairngorms National Park** and the Cairngorm Mountains and Deeside and Lochnagar NSAs.
- **Two waterbodie**s in Zone T2 are classified as having a **'bad' ecological status**.
- Significant fluvial **flooding** has occurred in the last ten years.

7. Zone T3: Central and Eastern Scotland

Overview of Zone T3

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for T3

7.1. Overview of Zone T3

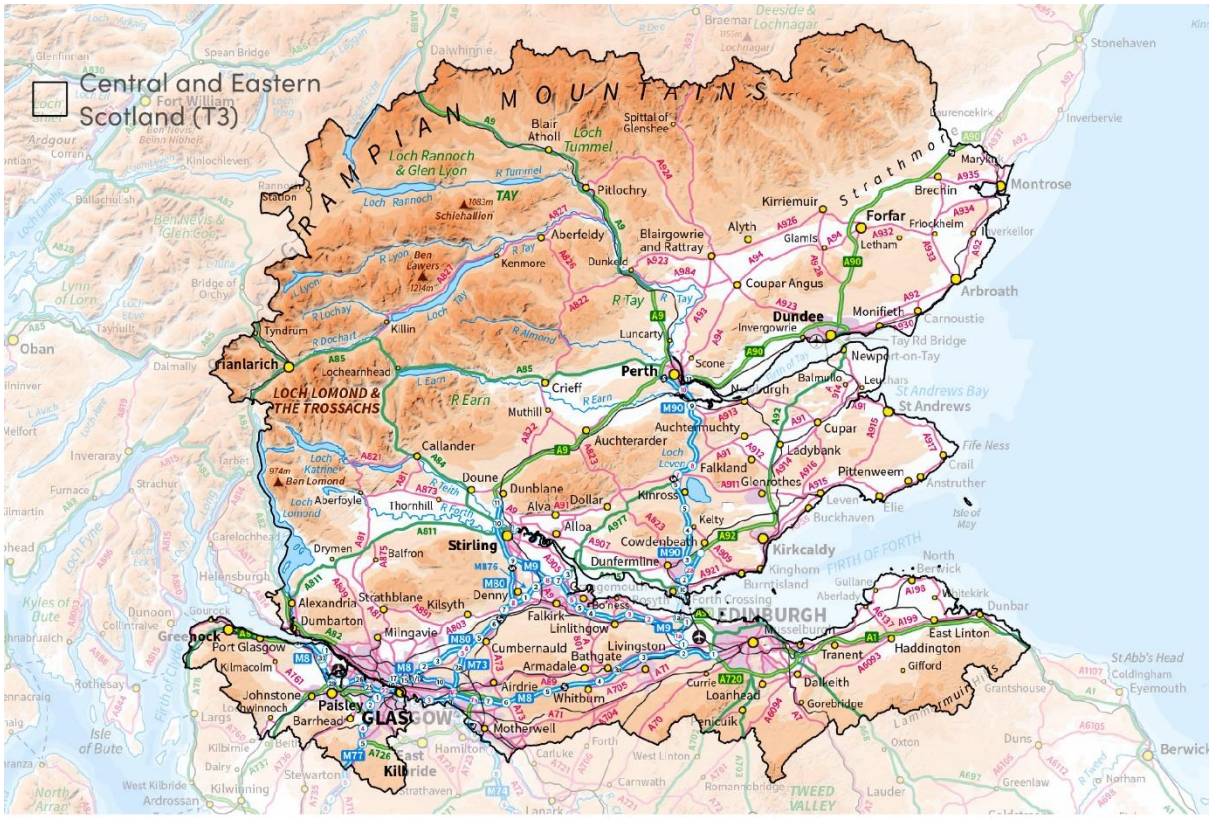

Figure 7.1: Area covered by Zone T3 – Central and Eastern Scotland

Zone T3 comprises the central and eastern part of Scotland.

The zone covers an area of **14,986km²** (see Figure 7.1 above) with a population of **3.5 million** (2022). The zone encompasses many of Scotland's key urban areas, including Edinburgh, Glasgow, Stirling, Perth and Dundee. The urban areas are generally located in the south, south east and east of the zone, with the west and north of the zone being dominated by more rural landscapes and southern Scottish Highlands.

The zone's highly valued landscapes in the western and northern areas include two National Parks and eight National Scenic Areas, recognised for their mountainous environment and lakes. Many of these areas are also sensitive in terms of their ecological significance, with both internationally and nationally designated sites. The Antonine Wall World Heritage Site runs between the River Forth and Clyde estuaries.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

7.2. Air quality

Air quality issues in the zone are largely associated with traffic and transport. As highlighted by the location of the **27 AQMAs** in the zone (see Figure 7.2 below), these are largely concentrated within the urban areas of Edinburgh (**1**) and Glasgow (**2**), along the M80, M9 and M8 corridors, Perth (**3**) and Dundee (**4**). The AQMAs in this zone are primarily designated for exceedances in the annual mean concentration objective of 40µg/m^3 for nitrogen dioxide (NO_2), though a few are designated for exceedances in the hour mean concentration objective of 200µg/m^3 for NO_2, and for exceedances linked to particulate matter (PM_{10}) - annual mean concentration objective of 40µg/m^3 and the 24 hour mean concentration objective of 50µg/m^3. This is largely associated with dust linked to vehicle movements – though it is noted that monitoring stations in Dundee have historically recorded higher levels of PM_{10} due to transboundary effects where emissions were blown in from continental Europe and added to locally emitted pollutants (industrial, transport and agricultural) and not well dispersed due to warm, calm weather conditions.[46]

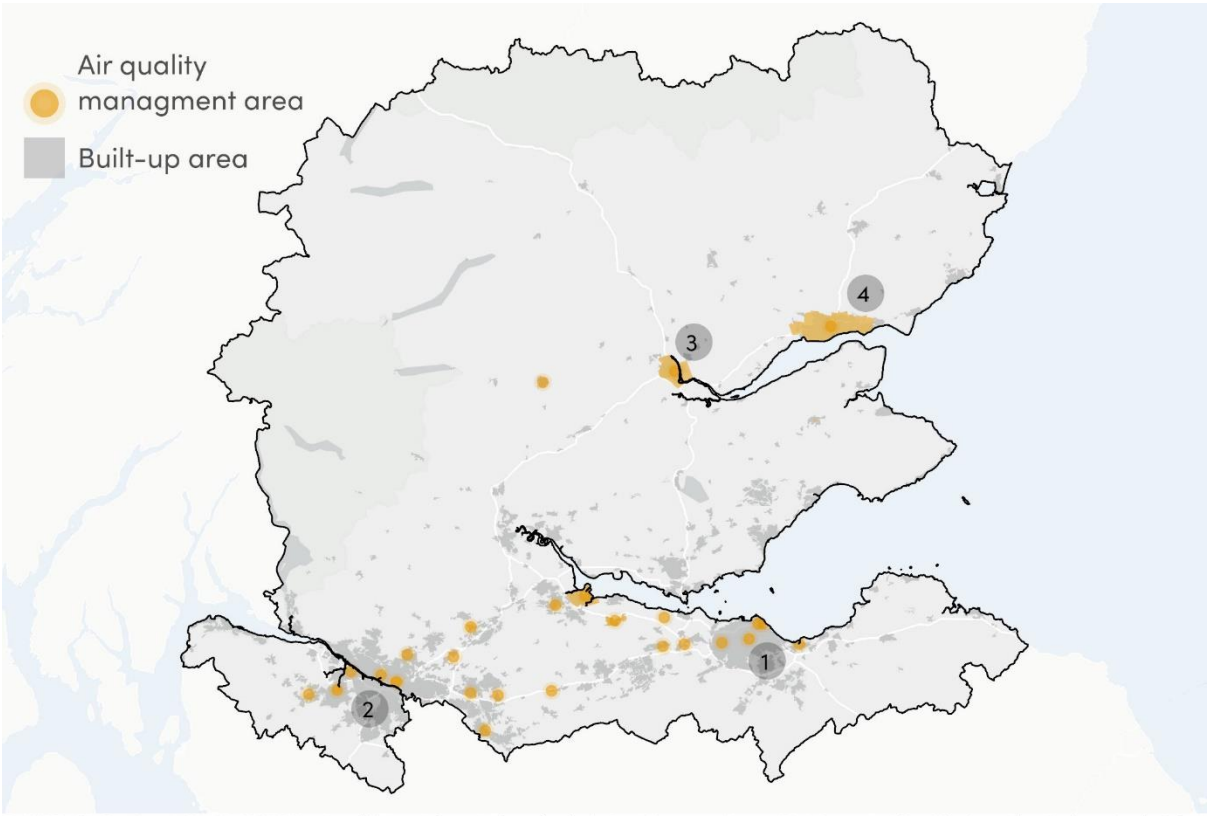

Figure 7.2: AQMAs in Zone T3

[46] Dundee City Council (2023): Annual Progress Report 2023

7.3. Climate change

In this zone, total greenhouse gas emissions amounted to **21,808.1 kt CO_2e** in 2022. The largest contributor to this total was the **transport sector** (approx. 27.7%), followed by the industrial sector and the domestic sector (both approx. 20.5%).[47]

The importance of peatland to the climate crisis in Scotland is recognised – with the Scottish Government pledging more than £250 million up to 2030 to support restoration projects[48]. Given that there are areas of Class 1 soil in this zone (nationally important carbon-rich soils, deep peat and priority peatland habitat[49]), there is the potential for **carbon storage** in this zone.

Primary impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections (UKCP18)[50], winters in Scotland are anticipated to be 1.24°C warmer between 2021-2040 and 2.8°C warmer between 2061-2080 in comparison to 1981-2000 (1.8°C). Warmer summers are also anticipated - with a 1.72°C increase anticipated for 2021-2040, and a 4°C increase for 2061-2080 in comparison to 1981-2000 (11.89°C). Winters in Scotland are anticipated to be wetter (increasing to 6.5mm/day in 2061-2080 in comparison to 5.82mm/day in 1981-2000), and drier in the summer (decreasing to 3.27mm/day in 2061-2080 in comparison to 3.93mm/day in 1981-2000).[51]

Secondary impacts from climate change are largely linked to changes in temperature, humidity and precipitation. These can be widespread and impact upon ecosystems, people, settlements and infrastructure. Changes in precipitation patterns can lead to an increase in flood events or the occurrence of drought, which can impact on agriculture and natural resources. Increased temperatures can also result in heat-related human mortality, and cause species loss. Additionally, higher temperatures and the occurrence of heatwaves can aggravate air pollution events and also limit the function of key infrastructure – including compromising energy systems. The Intergovernmental Panel on Climate Change (IPCC) outlines that the energy sector is climate-exposed, indicating that energy infrastructure will become increasingly vulnerable if design standards do not account for changing climate conditions[52]. Infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems are viewed as the most feasible adaptation techniques – alongside energy generation diversification (i.e., a greater use of renewable energy)[53].

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[47] UK Government (2022): UK local authority and regional greenhouse gas emissions statistics
[48] NatureScot (no date): Peatland ACTION – What we do
[49] NatureScot (2016): Carbon and Peatland 2016 map
[50] Met Office (no date): UKCP data
[51] Based on the RCP8.5 emissions scenario, which assumes there is fast population growth, low technical development rate, slow GDP growth, a massive increase in world poverty and high energy use and emissions. It also assumes no climate change mitigation or adaptation techniques are engaged with.
[52] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[53] IPCC (2019): Climate Change and Land

7.4. Community wellbeing

The population of the Central and Eastern Scotland zone is **3,511,373** (Scottish Census 2022). The population density of the zone is the highest in Scotland, with higher densities in the local authority areas of the major cities including Glasgow (3554.5 residents per square km), Dundee (2476.6) and Edinburgh (1946.5). The zone also includes areas with low population density including the Stirling local authority area, with 42.4 residents per square km.

In terms of its age profile, of the four Scottish zones, T3 has the highest percentage of people of **working age** (65%) and a significantly lower proportion of people of retirement age and above, at 18.7% (see Figure 7.3 overleaf) (Scottish Census 2022). The zone includes the cities of Edinburgh and Glasgow and thus a higher proportion of working age population is expected to benefit from the employment and other opportunities available in these areas.

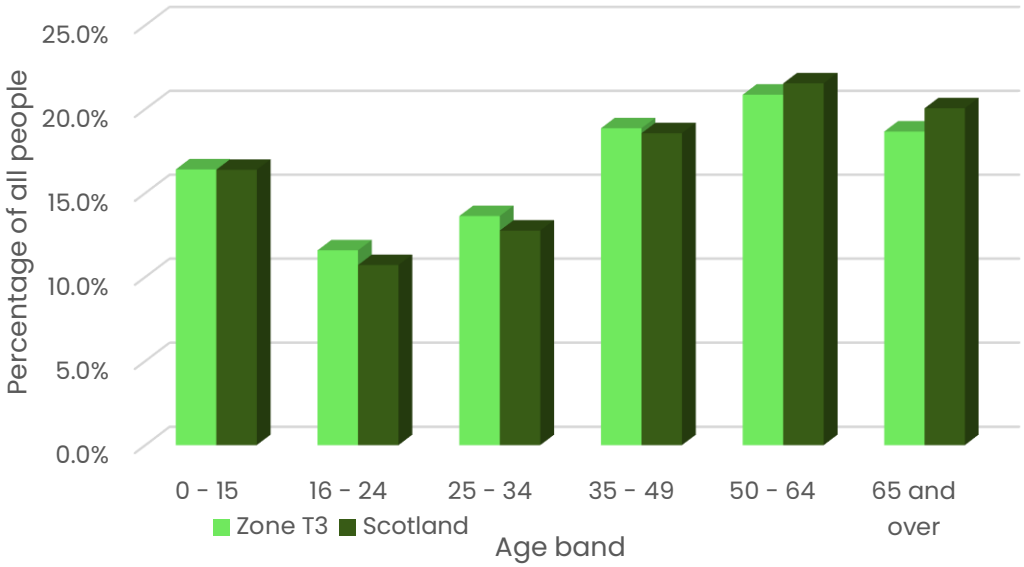

Figure 7.3: Age profile of Zone T3 (source Scottish Census 2022)

IMD data from 2019 shows that the zone includes locations with the **most deprived** communities in Scotland, in particular large parts of Glasgow, North Lanarkshire and Renfrewshire, Dundee and parts of Edinburgh. The zone also includes coastal towns and areas with high levels of deprivation, including Greenock, Kirkcaldy and Methil. There are also affluent pockets with communities amongst the least deprived, including to the north and south of Glasgow and east of Edinburgh.

Key 'traditional' economic sectors in the zone include agriculture, steel production, textile manufacturing and coal mining. Glasgow and Clydebank have also been traditional centres for shipbuilding. Whilst the maritime industry is no longer of the scale seen in the first half of the 20th century, there remains a significant defence shipbuilding/maritime industry in the area, including two major defence shipyards on the upper Clyde, a container port and a cruise terminal at Greenock and a number of commercial shipbuilding and ship repair facilities. The zone also includes HM Naval Base Clyde, which is home to the core of the Submarine Service, and is a key contributor to the economy.

Current economic sectors also include financial and professional services, digital and creative industries, government, retail and hospitality and tourism in eastern Scotland. West central Scotland, with Glasgow in particular, has a growing advanced manufacturing and creative industries sectors.

In Zone T3, the industries with the **highest regional GVA in 2022**[54] were the services sector and production sector.

The region has a comprehensive **rights of way network** which provides access and opportunities for leisure and nature-based recreation between settlements and provides access to the countryside and national parks. Long distance paths in the zone include the 101km Forth and Clyde and Union Canal towpaths and the 183km Fife Coastal Path. The zone also includes part of the Scottish National Trail.

7.5. Cultural heritage and historic environment

Zone T3 has a rich and diverse historic environment. Reflecting its position at the crossroads of Scotland, this is linked to its historic evolution from:

- The development of Chiefdom societies and trading links during the Neolithic period and Bronze Age.
- The creation of hillforts during the Iron Age.
- Roman invasions, occupations and retreats between the 1st and 3rd centuries.
- Anglian Northumbria in the east and the expansion of the Scotti into the kingdom of Strathclyde to the west.
- Ecclesiastical history associated with the establishment of monasteries.
- The Wars of Independence in the 13th and 14th centuries and subsequent struggles to maintain Scotland's independence up to the 1707 Act of Union.
- Religious conflict and the Reformation; the Scottish Enlightenment.
- Rapid urban growth associated with the industrial revolution.

[54] ONS (2024): Regional gross value added (balanced) by industry: all ITL regions

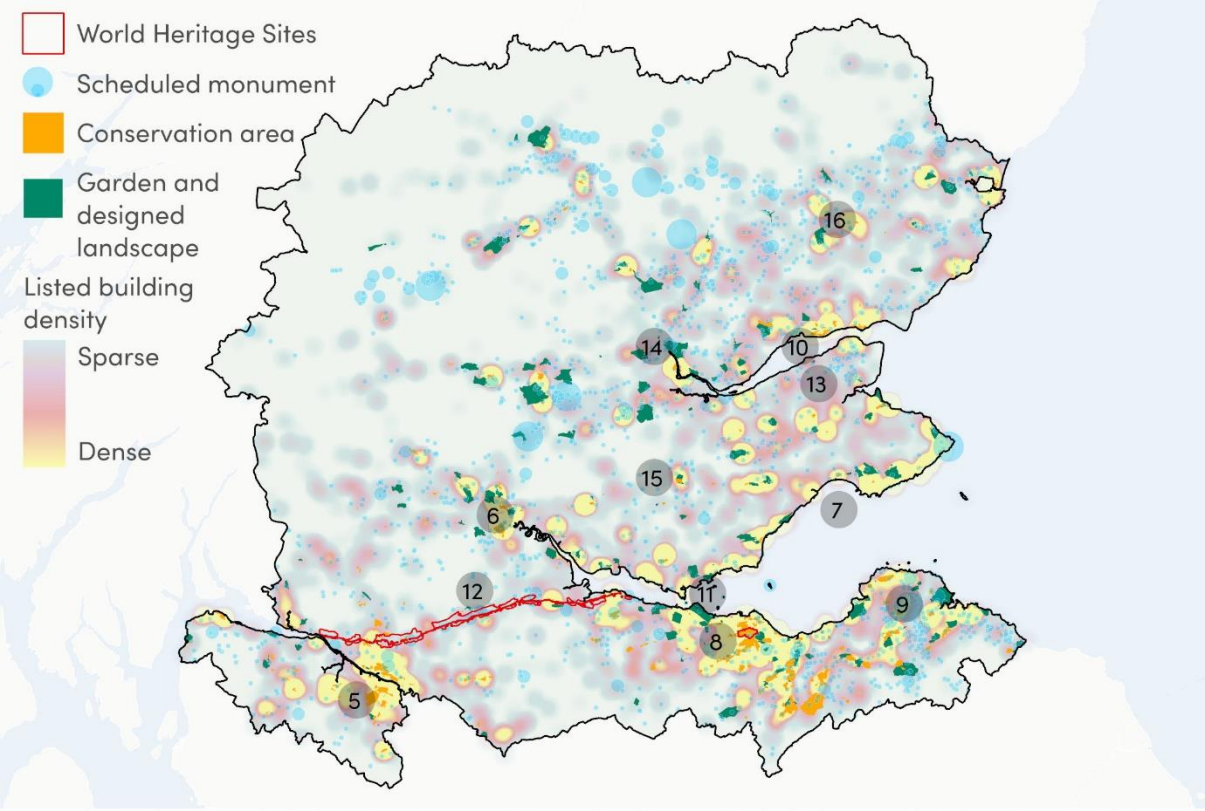

Figure 7.4: Designated heritage assets within Zone T3

Reflecting this historic evolution, concentrations of historic environment designations in the zone (as shown in Figure 7.4 above) include (but are not limited to):

- **Glasgow** (**5**): Reflecting its diverse ecclesiastical and educational heritage, its role as a major port and international business hub linked to its role as the 'second city of the British Empire' and its subsequent industrial development as a centre of the linen and textiles trade and ship building during the 19th century.
- **Stirling and the Forth Valley** (**6**): Including the historic environment of Alloa, Stirling, Bridge of Allan and Dunblane, representing the rich ecclesiastical, military, trading and transportation history of the area.
- **Coastal Fife** (**7**): Including the ecclesiastical and educational centre of St Andrews and the fishing villages of the East Neuk.
- **Edinburgh** (**8**): Reflecting its growth as a medieval burgh associated with its role as royal residence of the Scottish kings; ecclesiastical history associated with the Scottish Reformation; rising commercial prosperity of the 18th century and subsequent development of the New Town; development as a centre of the Scottish Enlightenment and neo-classic architecture of its new public buildings; and Scottish devolution in the late 20th century.
- **East Lothian** (**9**): Forming part of historic Haddingtonshire and including Dunbar, North Berwick and Haddington, the area has a rich historic environment associated with its involvement in medieval and early modern conflicts, the presence of several

fortified castles and buildings, seaside heritage as well as its farming, fishing and coal-mining heritage.

- **River Tay and Tay Estuary** (**10**): Including Dundee, a key trading port, focus of the jute industry and maritime and ship building centre, and Perth, which was the historic lowest crossing point of the Tay.

There are **three WHSs** in Zone T3:

Old and New Towns of Edinburgh (**8**): Edinburgh has been the Scottish capital since the 15th century. It has two distinct areas: the Old Town, dominated by a medieval fortress; and the neoclassical New Town, whose development from the 18th century onwards had a far-reaching influence on European urban planning. The harmonious juxtaposition of these two contrasting historic areas, each with many important buildings, is what gives the city its unique character. The contrast between the organic medieval Old Town and the planned Georgian New Town provides a clarity of urban structure unrivalled in Europe.

The Forth Bridge (**11**): This railway bridge, crossing the Forth estuary, had the world's longest spans (541 m) when it opened in 1890. It remains one of the greatest cantilever trussed bridges and continues to carry passengers and freight. Its distinctive industrial aesthetic is the result of a forthright and unadorned display of its structural components. Innovative in style, materials and scale, the Forth Bridge marks an important milestone in bridge design and construction during the period when railways came to dominate long-distance land travel.

Frontiers of the Roman Empire (**12**): Part of this WHS is located in Zone T3. The Antonine Wall was built under the Emperor Antoninus Pius in the 140's AD as an attempt to conquer parts of northern Britain and extends for some 60 km across central Scotland from the River Forth to the River Clyde. Through its military and civil constructions, it demonstrates cultural interchange through the extension of Roman technical skills, organisation and knowledge to the furthest reaches of the Empire. It embodies a high degree of expertise in the technical mastery of stone and turf defensive constructions. As it was in use for only a single generation, it provides a snapshot of the frontier at a particular point in time and offers a specific insight into how the frontier was designed and built.

Zone T3 has a rich and diverse **archaeological resource**. Concentrations of scheduled monuments include as follows:

- **East Lothian** (**9**): The area has a large number of defensive structures from the Bronze Age, Iron Age and medieval periods.
- **Northern Fife** (**13**): The area of northern Fife in between Leuchars and Tayport has a large cluster of Bronze Age finds, including settlements, field boundaries, cropmarks and barrows. There are also extensive WWII coastal defences in the area.
- **Tay valley and estuary** (**10**): The area around the River Tay has a rich archaeological resource. These include Neolithic timber, earthwork and megalithic sites and monuments, including those associated with ceremonies and burials; abundant evidence from the Iron Age, including lowland cropmark records and a series of Iron Age hillforts along the Tay Estuary (reflecting a period of instability in the area following a decline in climatic conditions); and finds from the medieval era.

- **Upland Perth** (**14**) and **Kinross** (**15**) and **Angus** (**16**): The hills of Perth and Kinross and the Braes of Angus have large clusters of archaeological remains dating from the late Bronze Age and Iron Age. These include burial, ceremonial, settlement and agricultural remains. There is also a wealth of archaeological resources from later periods, including the medieval period.

7.6. Ecology and biodiversity

Priority habitats are present across the zone and represent a diverse range of habitats and support a wide variety of species.

Particularly extensive habitats in Zone T3, as shown in Figure 7.5 below, include:

- Blanket bogs, wet heaths, and dry heaths in the Cairngorms (**17**)
- Arable land and market gardens (**18**)
- Blanket bogs, fens, swards, and highly artificial coniferous plantations (**19**)

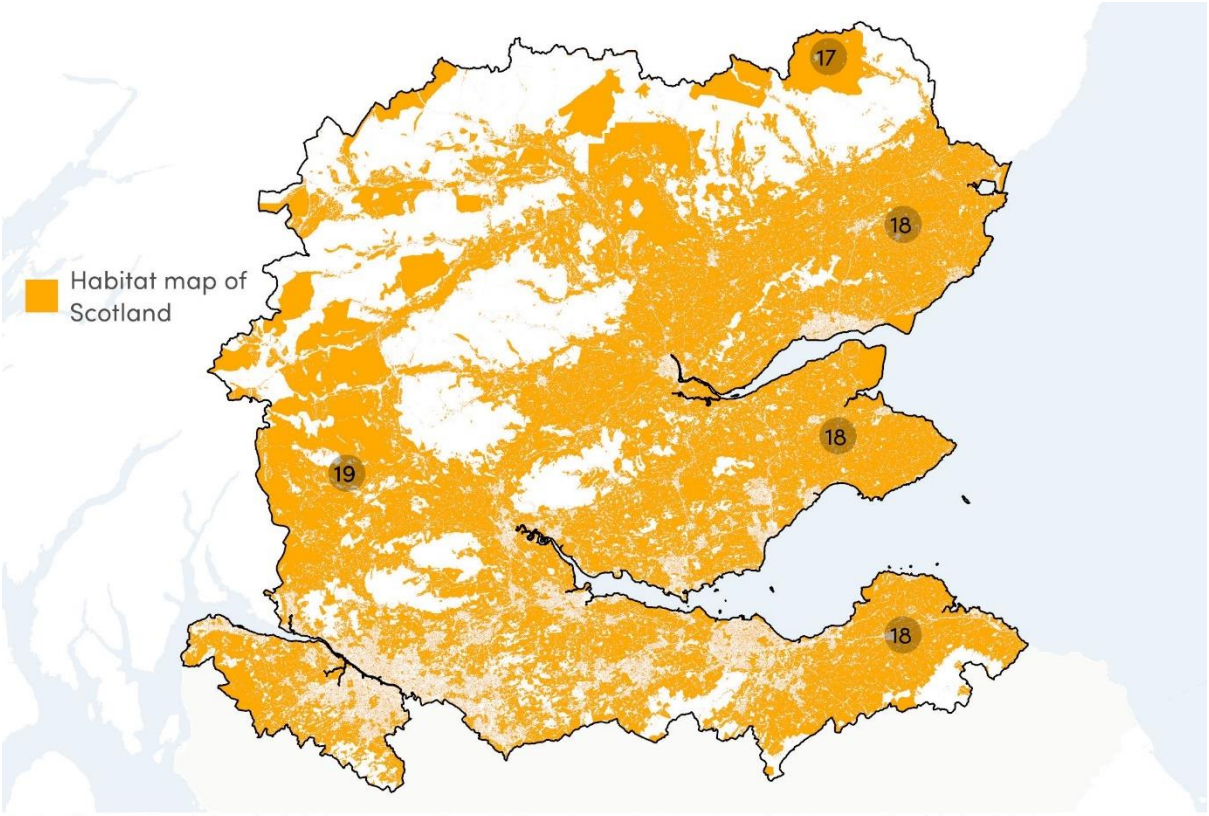

Figure 7.5: Cover of priority habitats in Zone T3

Overall, the area covered by **SAC** designations (including possible SACs) is 50,780 ha, or 3.4% of the zone; the area covered by **SPA** designations (including potential SPAs) is 115,082 ha or 7.7% of the zone; and the area covered by **Ramsar site** designations (including proposed Ramsar sites) is 5,478 ha or 0.4% of the zone. Internationally designated sites for biodiversity in Zone T3, as shown in Figure 7.6 overleaf, including:

- The Cairngorms SAC and SPA (**20**)

- Forest of Clunie SPA (**21**)
- Ben Lawers SAC (**22**)
- Glen Etive and Glen Fyne SPA (**23**)
- Renfrewshire Heights SPA (**24**)

The area covered by **SSSI** designations is 106,876 ha (7.1% of the zone). Nationally designated sites for biodiversity in Zone T3, as shown in Figure 5.6 below, include:

- The Great Trossachs Forest NNR (**25**)
- Ben More – Stob Binnein SSSI (**26**)
- Forest of Clunie SSSI (**21**)
- Ben Lawers SSSI and NNR (**22**)
- Renfrewshire Heights SSSI (**24**)

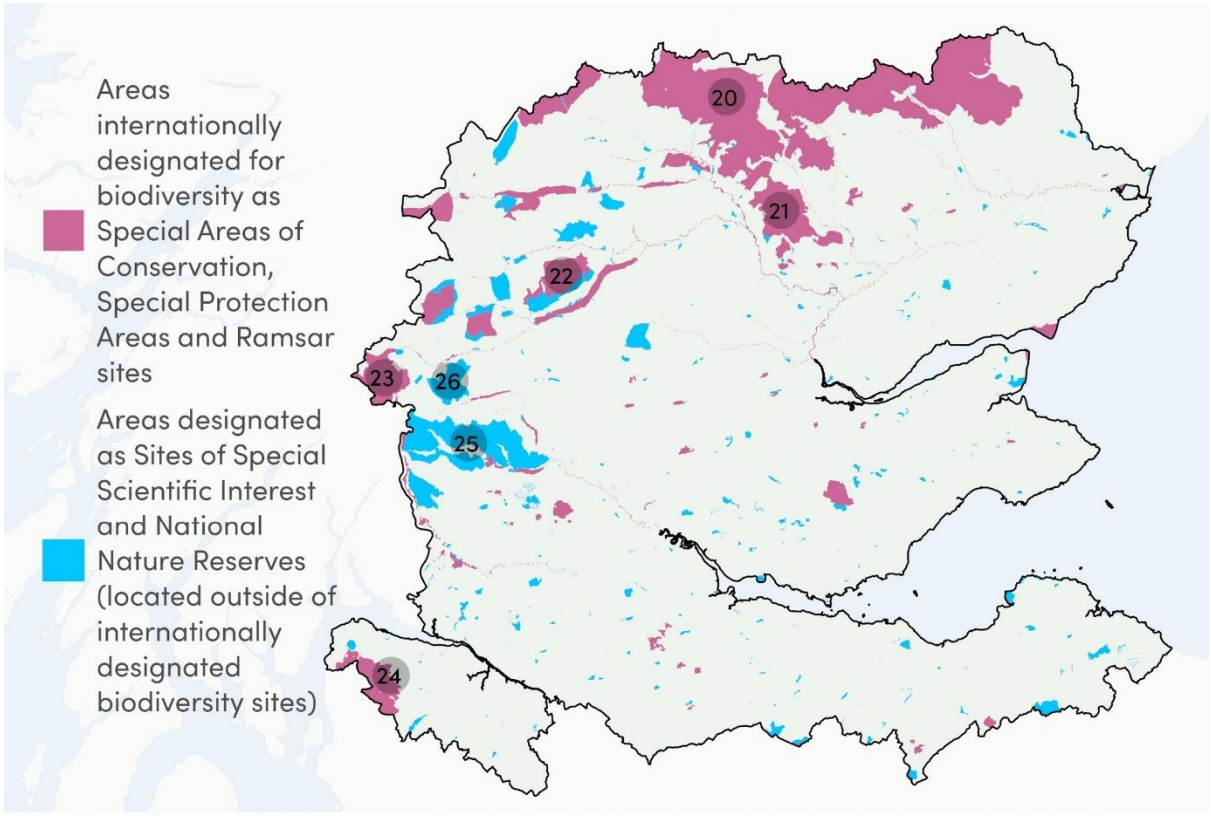

Figure 7.6: Internationally and nationally designated sites for biodiversity in Zone T3

The percentage of the zone covered by **ancient woodland** is 5.4%, totalling 80,480 ha.

7.7. Land and soil resources

In terms of the national scale land capability classification for agriculture, the highest-quality agricultural land in the zone can be found in Angus (**27**), eastern Perth and Kinross, Fife (**28**), Falkirk, West Lothian (**29**) and East Lothian (**30**) (see Figure 7.7 below). Overall, 6.7% of the zone is made up of **classes 1 and 2** (highest quality) land.

Much of the zone's northern and western areas are mountainous, with associated topography and soil types making them unsuitable for agriculture. A band of elevated

and mountainous land runs from Loch Lomond and the Trossachs National Park (**31**), in the west to the Grampian Mountains (**32**), and the Cairngorms National Park (**33**) in the north-east of the zone; this land is overlain by **classes 5, 6 and 7** (poor quality) land, making them less suitable for agricultural uses due to their less versatile potential. Elevated and lower classified land can also be found in around the Ochil Hills (**34**), Campsie Fells (**35**) and the Kilpatrick Hills (**36**), as well as along the southern boundary of the zone into the Southern Uplands (**37**).

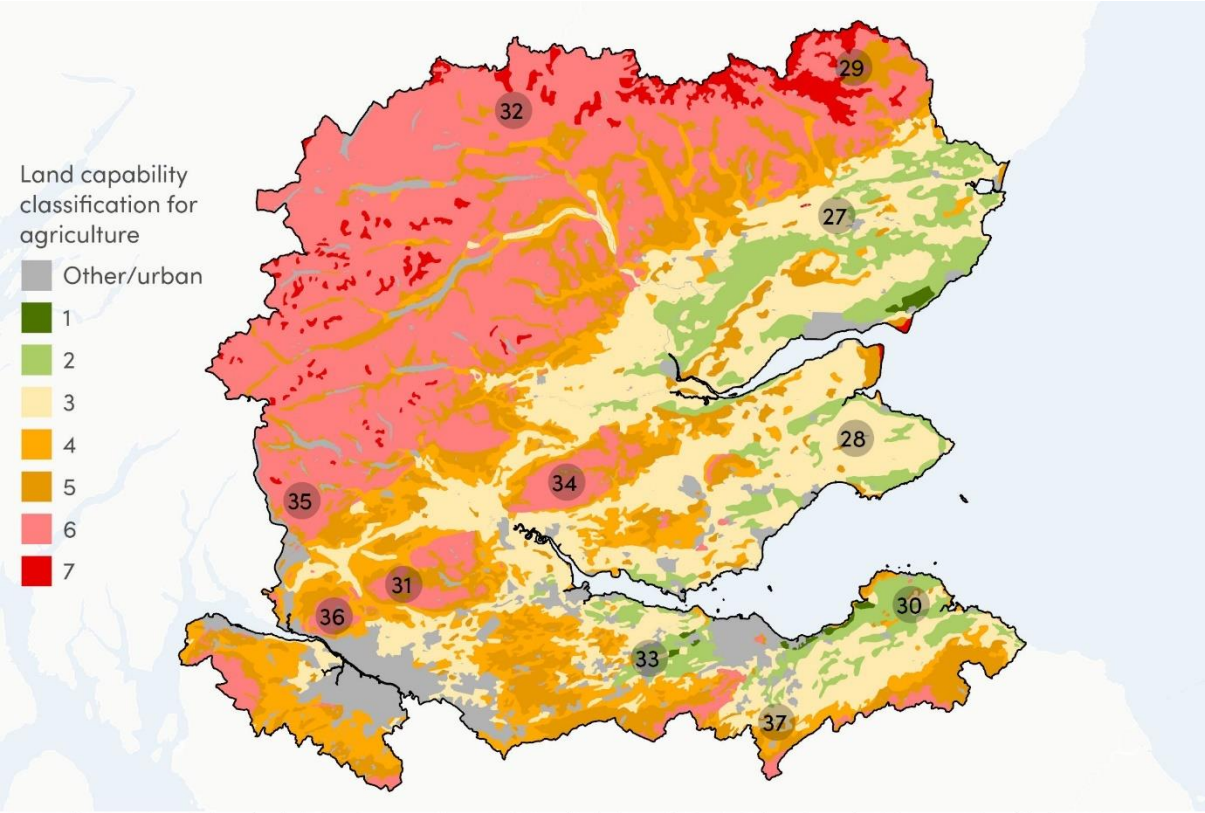

Figure 7.7: Agricultural land classification across Zone T3

7.8. Landscape and seascape

Zone T3 has a diverse range of landscapes, representing a significant breadth of landscape and seascape types which reflect the interplay of the area's topography, geology, biodiversity, land uses and cultural heritage.

The north and east of Zone T3 contain dramatic highland landscapes, with a strong presence of **uplands** and **glens**, **highland summits** and **plateaux**, and **mountains**. This area includes part of the Grampian mountain range, and is home to Ben Nevis, Scotland's tallest peak.[55]

[55] NatureScot (2002): Natural Heritage Zones: A National Landscape Assessment of Scotland's Landscapes

The landscape and seascape to the east of Zone T3 is varied, but gentler in character. The north-east and central areas are largely dominated by **agricultural heartlands** and **coastal farmland**. To the south, **plateau farmland** and **plateau moorland** can be found alongside significant **urban areas**, including Glasgow and Edinburgh.

The landscape of areas in and around Glasgow and Edinburgh, particularly in the Central Belt, has been heavily influenced by a history of **coal mining** and **heavy industry**. Industrial hubs along the River Clyde have also historically supported shipbuilding, steel, and iron production, leaving a legacy of **industrial towns**, **railway networks**, and **urbanised landscapes**.

A significant proportion of Zone T3 (22.0%) is covered by National Park or NSA status: the percent of the zone covered by National Parks is 15.4% (231,256 ha); and the percent covered by NSAs is 6.6% (99,181 ha).

The **Cairngorms National Park** (see Figure 7.8 overleaf) is an upland National Park in Scotland 's Central Highlands, in the Grampian mountain range, located between Perth and Inverness, 127 miles north of Edinburgh and 140 miles north of Glasgow. The National Park spans the council areas of Aberdeenshire Council, Angus Council, Moray Council, Perth & Kinross Council and The Highland Council. Its special qualities include wild, high mountains; heather moorlands; ancient woodlands; rivers; tranquillity; an extensive network of public rights of way; traditional land management practices; and many historic buildings and structures.

Loch Lomond and The Trossachs National Park (see Figure 7.8 overleaf) is located 23 miles north-west of Glasgow and 65 miles west of Edinburgh. The National Park is located on the boundary between Scotland's Central Lowlands and the southern edge of the Highlands, offering a diverse mix of lowland and upland landscapes. Its special qualities include rolling lowland landscapes; rugged mountains; lochs; ancient woodlands; tranquillity; an extensive network of public rights of way; traditional land management practices; and many historic buildings and structures.

There are **eight NSAs** located wholly or partly within Zone T3 (see Figure 7.8 overleaf). These include the inland landscapes of: Deeside and Lochnagar; River Tay (Dunkeld); River Earn (Comrie to St Fillans); Loch Rannoch and Glen Lyon; The Trossachs; Loch Lomond; Ben Nevis and Glen Coe; and Loch Tummel.

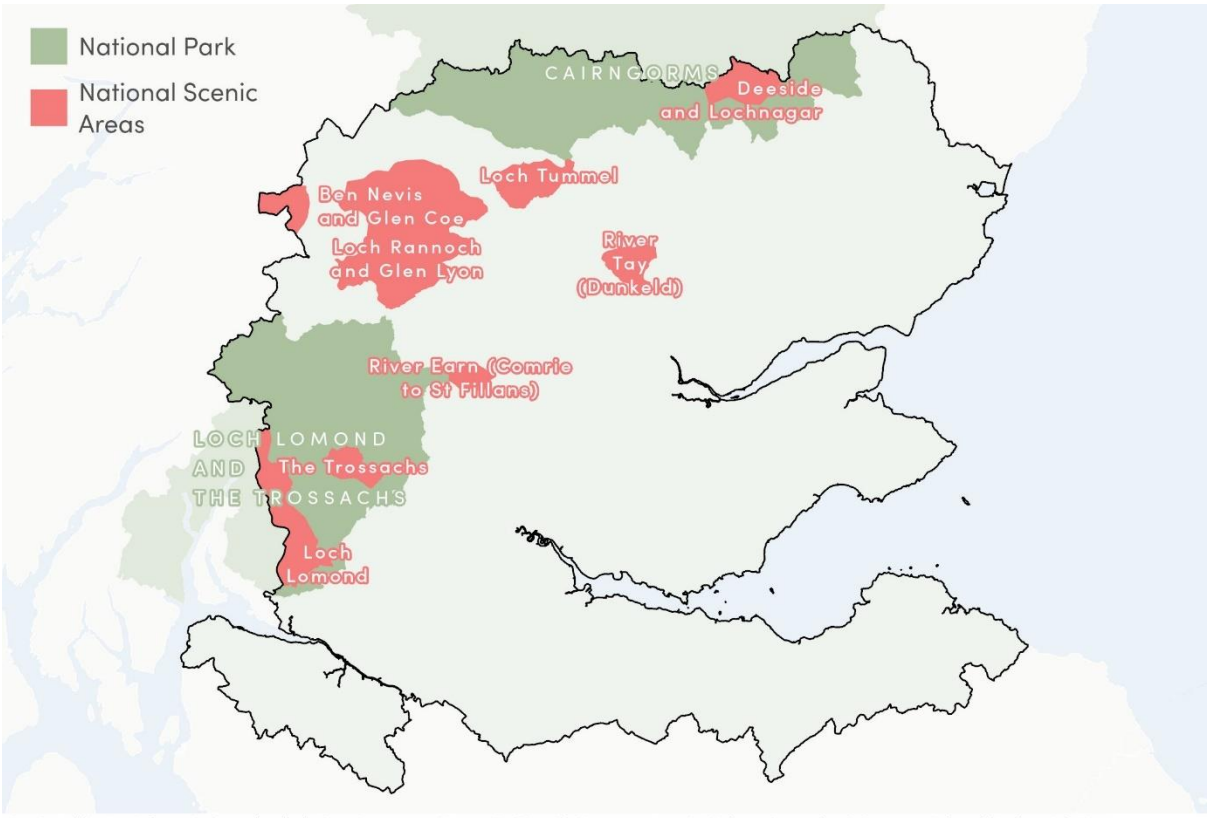

Figure 7.8: Designated landscapes within Zone T3

7.9. Water

According to the WFD river classification data, **23 waterbodies** in Zone T3 are classified as having a **'bad' ecological status**. These are:

- Allt a Chreagain Odhair
- Allt Conait
- Allt Dhuin Croisg
- Ardeonaig Burn
- Bannock Burn (Sauchie Burn confluence to Steuarthall Farm)
- Candren Burn
- Dargavel Burn
- Dubbs Water
- Dubh Eas / Allt nan Caorainn
- East Peffer
- Inveruglas Water
- Inzion Burn / Quharity Burn
- Killichonan Burn
- Kip Water
- Lawers Burn
- Lead Burn
- Malls Mire Burn / Polmadie Burn / Cityford Burn
- River Bruar

- River Ericht (Loch Ericht to Loch Rannoch)
- River Kelvin (Kelvinhead to Glazert)
- River Leven (Markinch to Estuary)
- Tentsmuir Sands Burn / Drain
- Turret Burn (Turret Loch to River Earn confluence)

The Flood Risk Management Plans that cover Zone T3, and the PVAs which falls within the zone, are set out below:

- The **Forth Estuary** Flood Risk Management Plan 2022 to 2028[56] identifies 30 PVAs for significant risk of flooding from various sources; **29 PVAs** are in this zone: Crail, Leven and Lower Largo, Kinross, Milnathort and Glenrothes, Kirkcaldy, Cardenden and Cowdenbeath, Inverkeithing, Rosyth and Dunfermline, Cairneyhill, Airth, Kincardine and Culross, Falkirk and Grangemouth, Bo'ness, Linlithgow, Livingston, Broxburn and Bathgate, Whitburn, West Calder and Fauldhouse, Slamannan, Edinburgh West, South Queensferry, Edinburgh North, Edinburgh, Water of Leith, Edinburgh, Braid Burn, Edinburgh, Niddrie Burn and Burdiehouse, Musselburgh, Dalkeith, Lasswade and Newtongrange, Penicuik, North Berwick, Dunbar and West Barns, Cockenzie, Port Seton, Longniddry and Prestnpans, and Haddington. Currently it is estimated that there are 115,000 people and 65,000 homes and businesses at risk from flooding. This is estimated to increase to 160,000 people and 89,000 homes and business by the 2080s due to climate change.
- The **Clyde & Loch Lomond** Flood Risk Management Plan 2022 to 2028[57] identifies 23 PVAs for significant risk of flooding from various sources; **18 PVAs** are in this zone: Helensburgh to Loch Long, Loch Lomond and Vale of Leven, Yorker catchment – Clydebank to Partick, River Kelvin, Glasgow City Centre, Glasgow City North, Luggie Water catchment, Strathblane, Coatbridge and Airdrie, East of Glasgow to Strathaven, Clyde catchment – Motherwell to Larkhall, Shotts, North of Wishaw, White Cart Water catchment, Black Cart Water catchment – Lochwinnoch to Johnstone, Gryfe catchment, Clyde South and Bishopton, and Greenock and Gourock. Currently it is estimated that there are 170,000 people and 98,000 homes and businesses at risk from flooding. This is estimated to increase to 220,000 people and 130,000 homes and business by the 2080s due to climate change.
- The **Tay** Flood Risk Management Plan 2022 to 2028[58] identifies **14 PVAs** for significant risk of flooding from various sources: Blair Atholl, Pitlochry, Aberfeldy and Weem, Alyth, Kirriemuir and Forfar, Blairgowrie and Rattray, Coupar Angus, Dunkeld and Birnam, Bankfoot, Luncarty, Scone, Perth and Almondbank, Comrie, and Bridge of Earn. Currently it is estimated that there are 13,000 people and 9,000 homes and businesses at risk from flooding. This is estimated to increase to 21,000 people and 13,000 homes and business by the 2080s due to climate change.

[56] Scottish Environment Protection Agency (2022): Forth Estuary Flood Risk Management Plan
[57] Scottish Environment Protection Agency (2022): Clyde & Loch Lomond Flood Risk Management Plan
[58] Scottish Environment Protection Agency (2022): Tay Flood Risk Management Plan

- The **Tay Estuary & Montrose Basin** Flood Risk Management Plan 2022 to 2028[59] identifies 15 PVAs for significant risk of flooding from various sources; **13 PVAs** are in this zone: Marykirk, Montrose Basin, Brechin, Arbroath, Carnoustie, Barry, Monifieth, Dundee, Broughty Ferry and Invergowrie, Newburgh, St Andrews, Pitscottie, Cupar and Springfield, Kingskettle and Kettlebridge, and Auchtermuchty. Currently it is estimated that there are 21,000 people and 14,000 homes and businesses at risk from flooding. This is estimated to increase to 29,000 people and 19,000 homes and business by the 2080s due to climate change.
- The **Forth** Flood Risk Management Plan 2022 to 2028[60] identifies **eight PVAs** for significant risk of flooding from various sources: Callander, Aberfoyle, Blackford, Dunblane and Bridge of Allan, Hillfoots Villages, Alloa, South Alloa, and Stirling. Currently it is estimated that there are 15,000 people and 8,000 homes and businesses at risk from flooding. This is estimated to increase to 23,000 people and 13,000 homes and business by the 2080s due to climate change.

Flood risk areas in Zone T1 are shown in Figure 7.9 below.

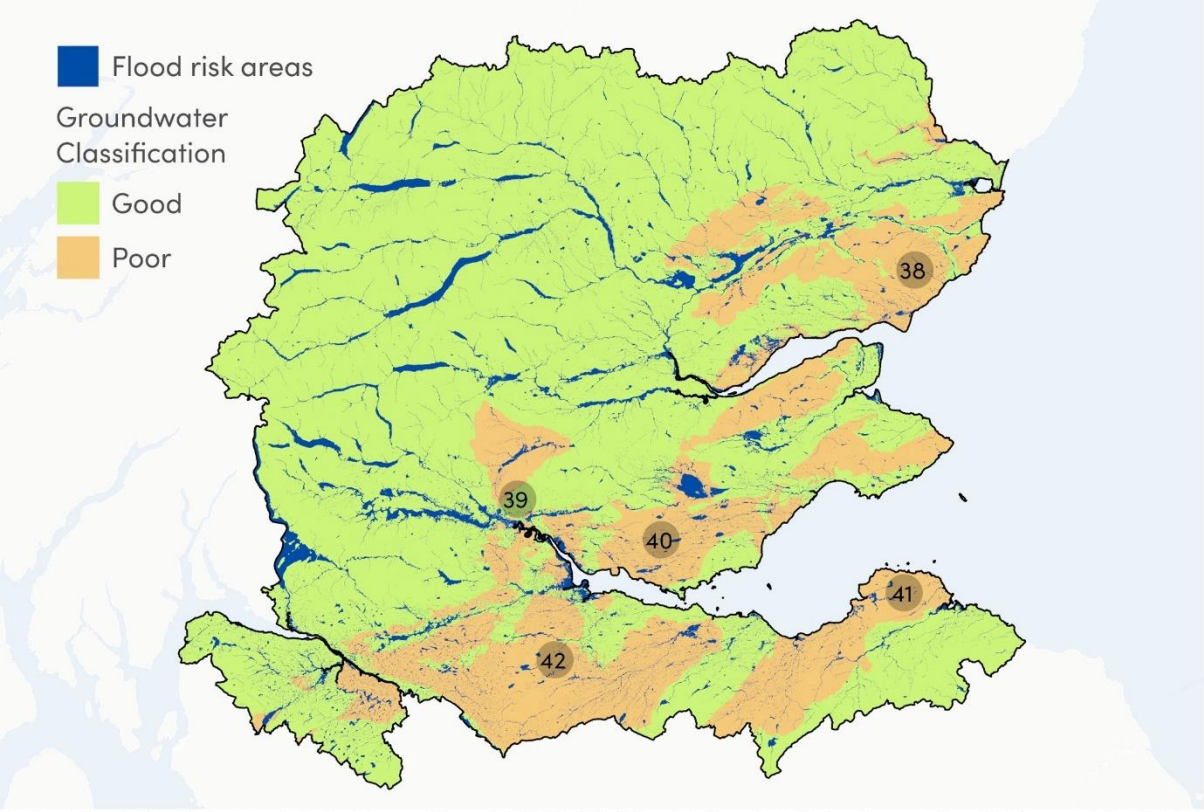

Figure 7.9: Flood risk areas within Zone T3

[59] Scottish Environment Protection Agency (2022): Tay Estuary & Montrose Basin Flood Risk Management Plan

[60] Scottish Environment Protection Agency (2022): Forth Flood Risk Management Plan

Groundwater conditions are classified as poor in the vicinity of Montrose, Arbroath and Dundee (**38**), Stirling (**39**), Dunfermline (**40**), Edinburgh, North Berwick (**41**), Glasgow, and Whitburn (**42**).

7.10. Key issues for Zone T3

The following key issues have been identified through the review of the baseline information for Zone T3:

- **Air quality** issues in the zone are largely associated with traffic and transport and are concentrated in urban areas.
- The **industrial sector** has a higher contribution to GHG emissions proportionally than elsewhere in Scotland.
- The zone has the **highest population density** in Scotland.
- The zone includes locations with the **most deprived** communities in Scotland, in particular large parts of Glasgow, North Lanarkshire and Renfrewshire, Dundee and parts of Edinburgh. The zone also includes coastal towns and areas with high levels of deprivation, including Greenock, Kirkcaldy and Methil.
- West central Scotland, with Glasgow in particular, has a growing **advanced manufacturing** sector.
- Central and Eastern Scotland has a rich and diverse **historic environment** and **archaeological** heritage, representing its location at the crossroads of Scotland and its natural resources. There are particular concentrations of industrial heritage across the zone.
- The central lowlands of Scotland have **rich agricultural land**, with the highest quality agricultural land located in Angus, eastern Perth and Kinross, Fife, Falkirk, West Lothian and East Lothian.
- The zone has a diverse range of landscapes, townscapes and seascapes. Part of the **Cairngorms National Park** and the whole of **Loch Lomond and The Trossachs National Park** are located in the zone. There are also eight NSAs located wholly or partly within Zone T3.
- **23 waterbodies** in Zone T3 are classified as having a **'bad' ecological status**.
- Numerous parts of the zone are at significant risk of **flooding**, in part reflecting the presence of the river systems of the Tay, Forth and Clyde and the increased prevalence of extreme weather events resulting from climate change.
- **Groundwater conditions** are classified as poor in the vicinity of Montrose, Arbroath and Dundee, Stirling, Edinburgh, North Berwick, Glasgow and Whitburn.

8. Zone T4: Southern Scotland

Overview of Zone T4

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for T4

8.1. Overview of Zone T4

Figure 8.1: Area covered by Zone T4 – Southern Scotland

Zone T4 comprises the Southern region of Scotland.

Zone T4 is an area which covers **15,895km²** (see Figure 8.1 above) with a population of **950,000** (2022). The zone covers southern Scotland, including Ayrshire, Dumfries and Galloway, South Lanarkshire and the Scottish Borders. Whilst it includes a number of urban areas, including Dumfries, Ayr, Kilmarnock, Peebles, Hawick, Jedburgh, Galashiels and Lanark, the area is predominantly rural.

The zone's natural landscape is predominantly comprised of mountains, uplands/hills and associated valleys, as well as some lowlands found around coastal areas. The area contains five National Scenic Areas, designated for their landscape value relating to both coastal/estuarian as well as upland qualities and a prospective National Park in Galloway. The zone contains a range of sites which are internationally and nationally designated for their ecological value, as well as a significant amount of priority habitat.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

8.2. Air quality

Air quality issues in the zone are limited and largely associated with traffic and transport, as highlighted by the location of the **two AQMAs** in the zone (see Figure 8.2 below), which are located in the northern edge of the zone in South Lanarkshire on the edge of **Glasgow** (**1**) and **East Kilbride** (**2**). These are designated for exceedances in the annual mean concentration objective of 40µg/m^3 for PM_{10} – associated with dust due to vehicular movements. It is noted there was also an AQMA in Lanark, but it was revoked in 2024.

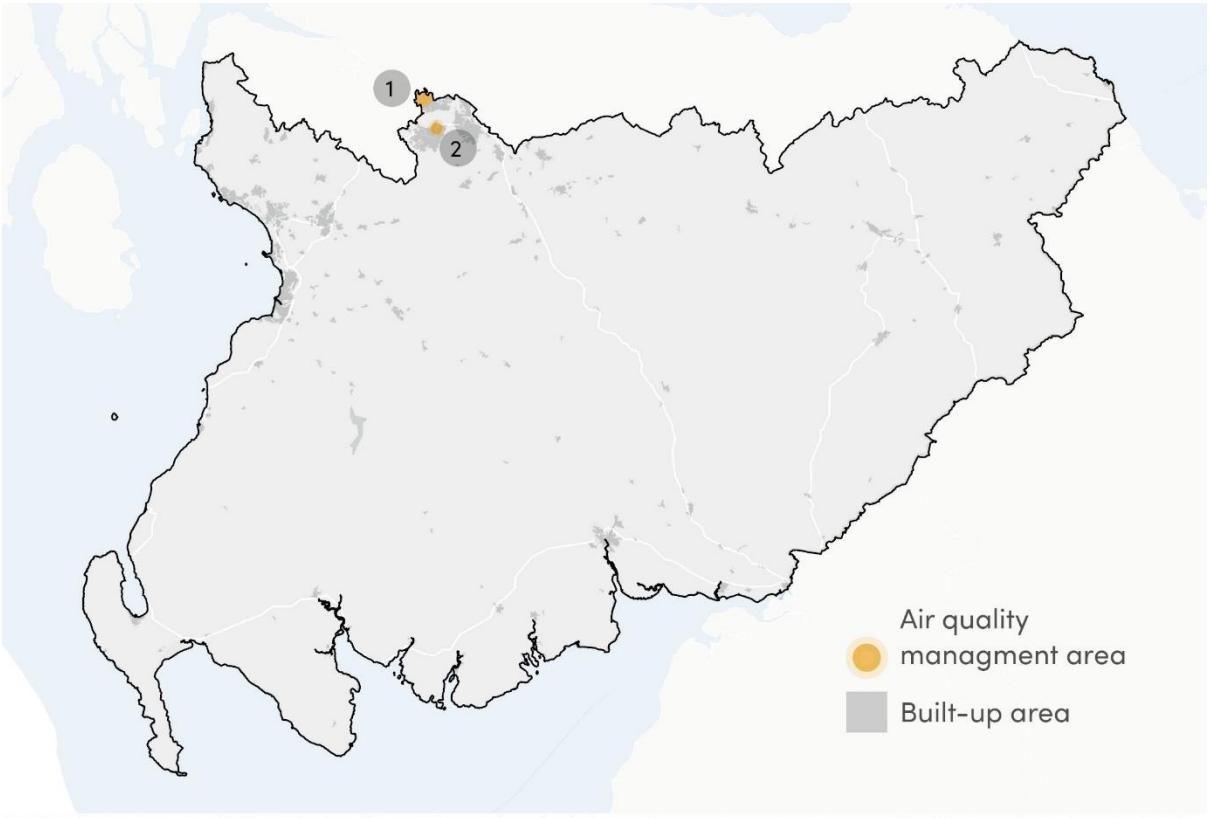

Figure 8.2: AQMAs in Zone T4

8.3. Climate change

In this zone, total GHG emissions amounted to **7,648.7kt CO_2e** in 2022. The largest contributor to this total was the **agricultural sector** (approx. 41.4%), followed by the transport sector (approx. 26.5%) and the domestic sector (approx. 17.9%).[61]

In this zone, **the land use, land use change and forestry sector** removed approx. 350.6 kt CO_2e in 2022. Given the amount of Class 1 soil coverage in this zone (nationally important carbon-rich soils, deep peat and priority peatland habitat[62]), the zone has a significant **carbon storage potential**. The importance of peatland to the climate crisis in Scotland is

[61] UK Government (2022): UK local authority and regional greenhouse gas emissions statistics
[62] NatureScot (2016): Carbon and Peatland 2016 map

recognised – with the Scottish Government pledging more than £250 million up to 2030 to support restoration projects[63].

Primary impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections (UKCP18)[64], winters in Scotland are anticipated to be 1.24°C warmer between 2021-2040 and 2.8°C warmer between 2061-2080 in comparison to 1981-2000 (1.8°C). Warmer summers are also anticipated - with a 1.72°C increase anticipated for 2021-2040, and a 4°C increase for 2061-2080 in comparison to 1981-2000 (11.89°C). Winters in Scotland are anticipated to be wetter (increasing to 6.5mm/day in 2061-2080 in comparison to 5.82mm/day in 1981-2000), and drier in the summer (decreasing to 3.27mm/day in 2061-2080 in comparison to 3.93mm/day in 1981-2000)[65]. This zone is at risk of coastal change, which has the potential to be exacerbated by climate change.

Secondary impacts from climate change are largely linked to changes in temperature, humidity and precipitation. These can be widespread and impact upon ecosystems, people, settlements and infrastructure. Changes in precipitation patterns can lead to an increase in flood events or the occurrence of drought, which can impact on agriculture and natural resources. Increased temperatures can also result in heat-related human mortality, and cause species loss. Additionally, higher temperatures and the occurrence of heatwaves can aggravate air pollution events and also limit the function of key infrastructure – including compromising energy systems. The Intergovernmental Panel on Climate Change (IPCC) outlines that the energy sector is climate-exposed, indicating that energy infrastructure will become increasingly vulnerable if design standards do not account for changing climate conditions[66]. Infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems are viewed as the most feasible adaptation techniques – alongside energy generation diversification (i.e., a greater use of renewable energy)[67].

8.4. Community wellbeing

The population of the Southern Scotland area is **950,385** (Scottish Census 2022). The zone has a low population density with density averaging 22.7 and 24.7 residents per square km in the Dumfries and Galloway and the Scottish Borders local authority areas. The local authority with the highest population density, South Lanarkshire, averages 184.7 residents per square km.

In terms of its age profile, the Southern Scotland zone has a higher percentage of people of **retirement age** and above, at 23.3% compared to the Scottish average of 20.1% (see

[63] NatureScot (no date): Peatland ACTION – What we do
[64] Met Office (no date): UKCP data
[65] Based on the RCP8.5 emissions scenario, which assumes there is fast population growth, low technical development rate, slow GDP growth, a massive increase in world poverty and high energy use and emissions. It also assumes no climate change mitigation or adaptation techniques are engaged with.
[66] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[67] IPCC (2019): Climate Change and Land

Figure 8.3 overleaf). This age profile pattern is likely to persist in the medium term, as the zone also has a higher than Scottish average proportion of people aged 50 to 64 (Scottish Census 2022).

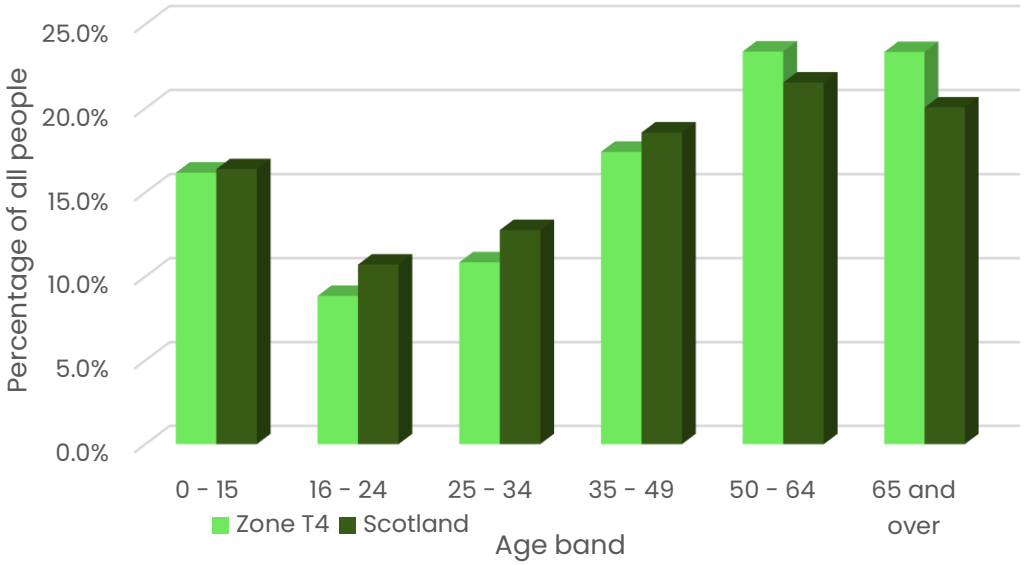

Figure 8.3: Age profile of Zone T4 (source Scottish Census 2022)

IMD data from 2019 shows that particular **pockets of deprivation** include parts of Rutherglen, Hamilton, Larkhall and Kilmarnock. The zone also includes coastal towns and areas with high levels of deprivation, including Ayr, Irvine, Saltcoats and Ardrossan.

Key 'traditional' economic sectors in the zone include agriculture, small scale textile manufacturing and forestry and timber production. The zone also includes growing renewable energy generation and tourism sectors.

In Zone T4, the industries with the **highest regional GVA in 2022**[68] were the services sector and production sector.

The zone has an excellent **rights of way network**, some of which provide for nature-based recreation, leisure and tourism. Long distance paths in the zone include the 338km Southern Upland Way and the 88km Annandale Way. The zone also includes part of the Scottish National Trail.

8.5. Cultural heritage and historic environment

Southern Scotland has a rich and diverse historic environment. This is linked to:

- Its historic evolution from the development of chiefdom societies and trading links during the Neolithic period and Bronze Age.
- The creation of hillforts during the Iron Age.
- Roman invasions, occupations and retreats between the 1st and 3rd centuries.
- The settlement of the Tweed lowlands and its assimilation into Anglian Northumbria and the expansion of the Scotti into the Kingdom of Strathclyde.

[68] ONS (2024): Regional gross value added (balanced) by industry: all ITL regions

- Viking incursions and settlement.
- Ecclesiastical history associated with establishment of monasteries and the Border abbeys.
- The emergence of Scotland and England as political entities, with the national border between the Solway and Tweedmouth.
- The Wars of Independence in the 13th and 14th centuries and subsequent struggles to maintain Scotland's independence up to the 1707 Act of Union.
- Religious conflict and the Reformation.
- Industrialisation associated with the textile industry, coal and lead mining and iron production.

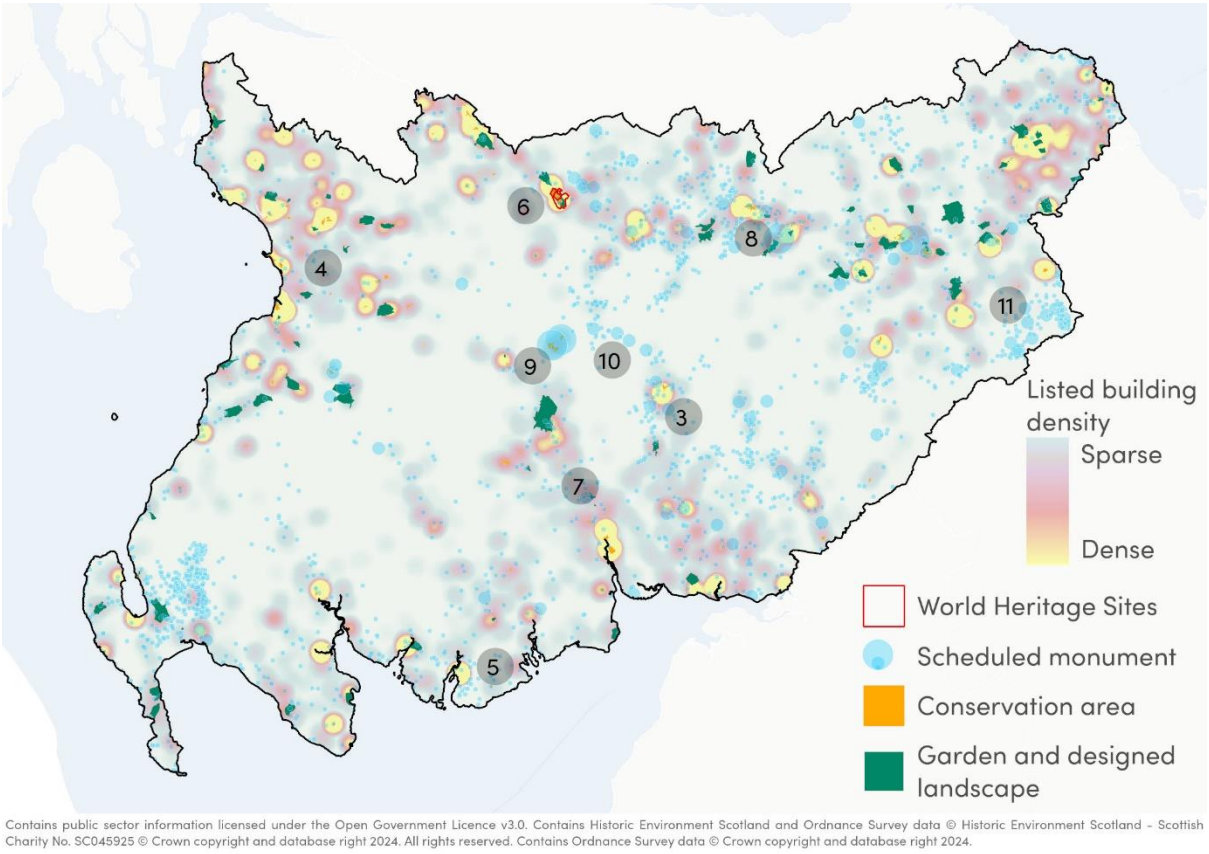

Figure 8.4: Designated heritage assets within Zone T4

Concentrations of historic environment designations in the zone (see Figure 8.4 above) include (but are not limited to):

- **Annandale** (**3**): Reflecting the historic settlement of the valley, its role during important periods of Scottish history, and its historic role as a key link to the north and south.
- **Ayrshire** (**4**): Including linked with the area's industrial heritage associated with the textile industry, coalmining and iron production.
- **Coastal Solway** (**5**): Reflecting the historic landscapes and seascapes of the area, incorporating remnants of the area's rich ecclesiastical history, prominent defensive structures such as Caerlaverock Castle, and maritime heritage.

- **Clyde Valley** (**6**): Including linked to industrial heritage associated with the textile industry, which drew on the power of the Clyde, and important historic settlements such as the model town of New Lanark.
- **Dumfries and the Nith Valley** (**7**): Including associated with the River Nith's role as an important inland waterway leading from Solway Firth through the agricultural hinterland of Dumfriesshire to the upland, industrialised landscape around New Cumnock.
- **Tweed Valley** (**8**): Including historic towns such as Innerleithen, Peebles, Galashiels, Melrose, Kelso, Coldstream, its rich historic environment reflects its role as a major historic trading route, and its strategic location which made it a focus of wars between Scotland and England.

There is one WHS in the zone, the **New Lanark WHS** (**6**). New Lanark is an exceptional example of a purpose-built 18th century mill village, set in a picturesque Scottish landscape near the Falls of Clyde, where in the early years of the 19th century, the Utopian idealist Robert Owen (1771-1858) inspired a model industrial community based on textile production. The creation of the model industrial settlement at New Lanark, in which planning and architecture were integrated with a humane concern on the part of the employers for the well-being of the workers, is a milestone in social and industrial history.

The zone has a rich and diverse **archaeological resource**. Concentrations of scheduled monuments include as follows:

- **Esk Valley and upper Annandale** (**3**): The valleys contain a wealth of Neolithic, Iron Age, and Romano-British remains, reflecting their roles as important routes from the Solway Firth.
- **Leadhills** (**9**): The hillsides around the village of Leadhills in South Lanarkshire contain an extensive area of workings and structures associated with lead mining. These date mostly from the mid/late 18th century and 19th century.
- **Southern Uplands** (**10**): The hills of the Southern Uplands as a whole provided ideal sites for Iron Age hill forts, reflecting the defensive nature of the settlements necessitated by a period of instability and the development of tribal fiefdoms.
- **Cheviot Hills** (**11**): The Cheviot Hills have large concentrations of Bronze Age settlements and associated features such as burial grounds and cairns. It also has a large concentration of native homesteads and farmsteads dating from the Roman period.
- **Tweed Valley** (**8**): The Tweed Valley has a rich Roman archaeological resource, as reflected by the site of Trimontium, which was once home to the largest Roman fort complex north of Hadrian's Wall. It also has numerous finds from the Iron Age, medieval sites and sites of industrial heritage.

There are a large number of historic gardens and designed landscapes in the Tweed valley, reflecting its concentration of prominent agricultural estates, drawing on the ecclesiastical and military heritage of the area. In addition, there are large concentrations of gardens and designed landscapes in the Clyde valley and Ayrshire. These are in part reflective of these areas' industrial wealth.

8.6. Ecology and biodiversity

Priority habitats are present across the zone and represent a diverse range of habitats and support a wide variety of species.

Particularly extensive habitats in Zone T4, as shown in Figure 8.5 overleaf, include:

- Blank bog in the Glen App and Galloway Moors (**12**)
- Blanket bogs and wet heaths in the Muirkirk and North Lowther Uplands (**13**)
- Arable land and market gardens (**14**)
- Lines of trees, small anthropogenic woodlands, recently felled woodland, early-stage woodland and coppice; closed non-Mediterranean dry acid and neutral grassland; blanket bogs, and wet heaths (**15**)

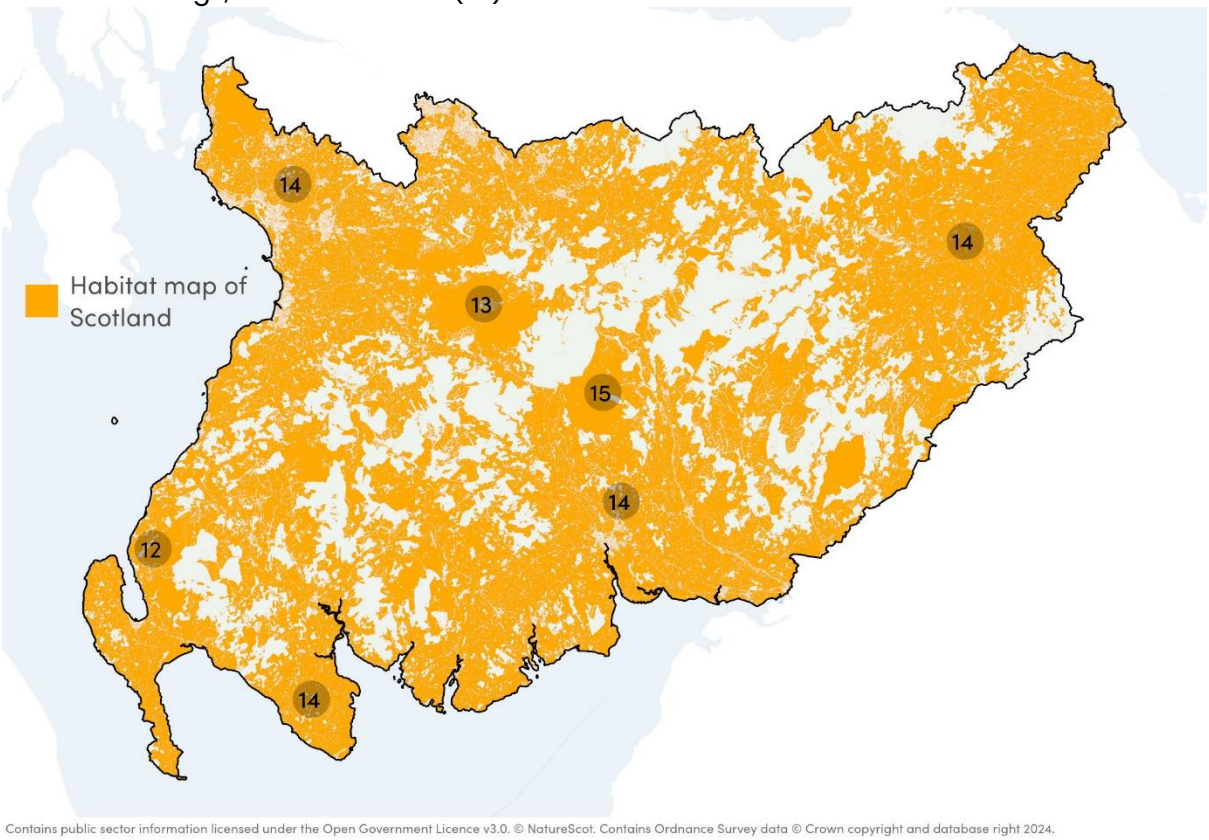

Figure 8.5: Cover of priority habitats in Zone T4

Overall, the area covered by **SAC** designations (including possible SACs) is 33,036 ha, or 2% of the zone; the area covered by SPA designations (including potential SPAs) is 50,336 ha or 3% of the zone; and the area covered by **Ramsar site** designations (including proposed Ramsar sites) is 4,129 ha or 0.3% of the zone. Internationally designated sites for biodiversity in Zone T4, as shown in Figure 8.6 overleaf, include:

- Muirkirk and North Lowther Uplands SPA (**16**)
- Moorfoot Hills SAC (**17**)
- Langholm - Newcastleton Hills SPA (**18**)
- Merrick Kells SAC (**19**)
- Glen App and Galloway Moors SPA (**20**)

The area covered by **SSSI** designations is 107,824 ha (6.8% of the zone). Nationally designated sites for biodiversity in Zone T4, as shown in Figure 8.6 overleaf, include:

- Cairnsmore of Fleet SSSI and NNR (**21**)
- Langhenghie and Airie Hills SSSI (**22**)
- Tweedsmuir Hills (**23**)
- Muirkirk and North Lowther Uplands SSSI (**16**)
- Moorfoot Hills SSSI (**17**)
- Langholm - Newcastleton Hills SSSI (**18**)
- Merrick Kells SSSI (**19**)
- Glen App and Galloway Moors SSSI (**20**)

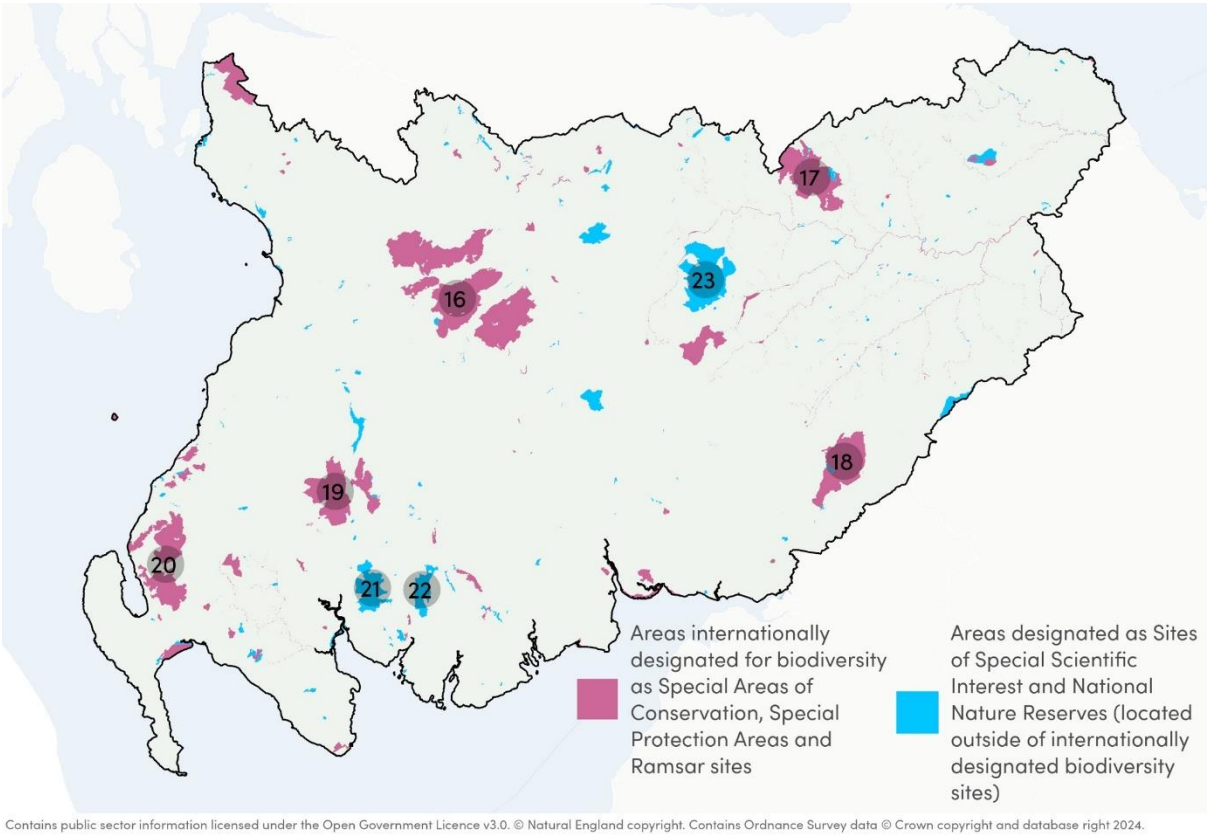

Figure 8.6: Internationally and nationally designated sites for biodiversity in Zone T4

The percentage of the zone covered by **ancient woodland** is 2.4%, totalling 38,650 ha.

8.7. Land and soil resources

In terms of the national scale land capability classification for agriculture, the Southern Uplands make up the significant majority of this zone, with their elevated topography, geological composition and natural processes resulting in the zone having very little higher quality agricultural land (**classes 1 and 2**) (see Figure 8.7 overleaf). Overall, 78% of the zone is **class 4** land or below, meaning that the land is not versatile in its agricultural potential, or would only support grazing activities. Small amounts of **class 2** land can be found in the east of the zone, around the low-lying land associated with the land

surrounding the River Teviot and the River Tweed (**24**). Higher quality agricultural land can also be found in Ayrshire (**25**) and Dumfriesshire, along the Solway Firth (**26**).

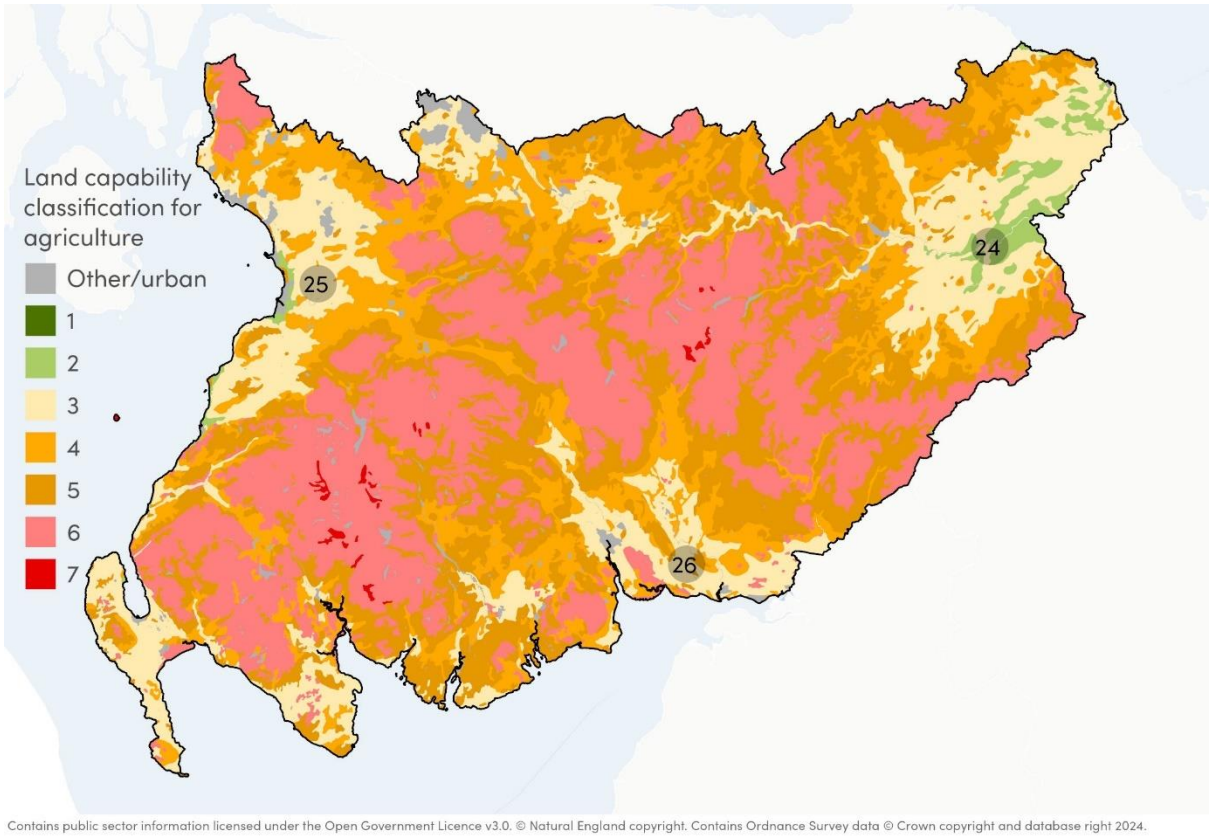

Figure 8.7: Agricultural land classification across Zone T4

8.8. Landscape and seascape

Zone T4 has a diverse range of landscapes, representing a significant breadth of landscape and seascape types which reflect the interplay of the area's topography, geology, biodiversity, land uses and cultural heritage.

The western extent of Zone T4 contains the Rhins of Galloway, a double-headed peninsula characterised by **rocky coasts** and **braes**, with **coastal flats** and **gorsey knolls** inland.[69]

The central area of Zone 4 comprises a series of **upland massifs** of hills, drumlins, and plateaux separated by **valleys and glens**, and tending to open to **coastal flats** to the central south. The core central area of Zone 4 is also characterised by extensive areas of **forestry** (including Galloway Forest Park), while the central-northern areas of Zone T4 have a significant history of **coal mining**. This is particularly notable in parts of Ayrshire (in towns such as Ayr and Kilmarnock), with the historic industry having influenced the local landscape with the creation of **spoil heaps**, **pits**, and other mining infrastructure.

[69] NatureScot (2002). '*Natural Heritage Zones: A National Landscape Assessment of Scotland's Landscapes*' can be accessed via this link.

Moving to the east of Zone T4, the landscape is characterised by **uplifted mountain ranges**, **hill slopes** and **summits**, before transitioning towards **lowlands** with agricultural fields by the coast.

Part of Zone T4 (2.4%; 35,965 ha) is covered by NSA status, with there being **five NSAs** (see Figure 8.8 below) located wholly or partly within the zone. These range from the coastal landscapes and seascapes of the Fleet Valley, East Stewartry Coast, and Nith Estuary, to the inland landscapes of Upper Tweeddale and Eildon and Leaderfoot.

While there are currently no National Parks within Zone T4, the Scottish Government is proposing to designate a new National Park in Galloway.[70] If designated, the National Park would cover a significant amount of the land within Zone T4. The process is at the public consultation stage, running until February 2025, with the proposed new National Park's exact boundaries yet to be determined.

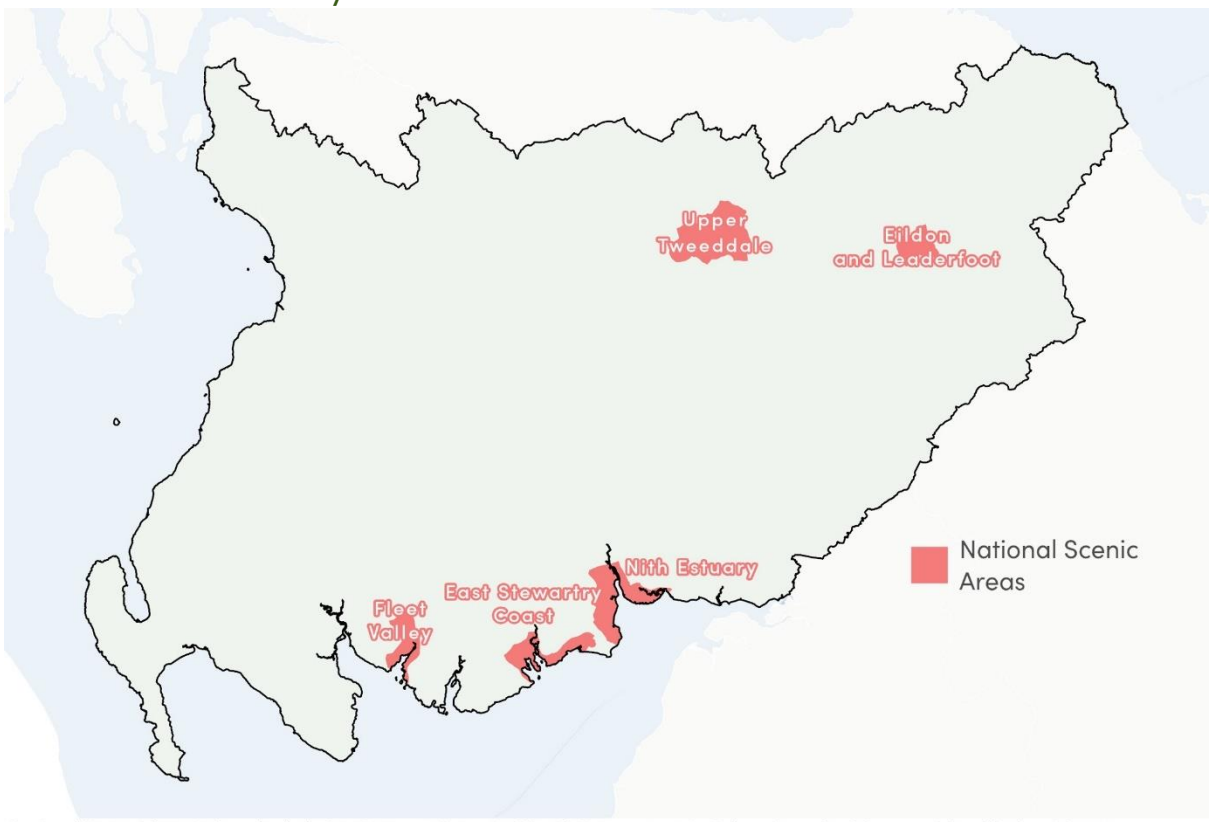

Figure 8.8: Designated landscapes within Zone T4

8.9. Water

According to the WFD river classification data, **10 waterbodies** in Zone T4 are classified as having a **'bad' ecological status**. These are:

- Gairland Burn
- Gala Water (Source to Armet Water confluence)
- Hareford Burn

[70] Scottish Government (2024): New National Park is proposed in Galloway

- Ladykirk Burn
- Lochar Water / Park Burn
- Polmaddy Burn
- River Cree (u/s Carrick Burn)
- Water of Fail
- Water of Ken
- Water of Ken (d/s Kendoon)

The Flood Risk Management Plans that cover Zone T4, and the PVAs which falls within the zone, are set out below:

- The **Solway** Flood Risk Management Plan 2022 to 2028[71] identifies **24 PVAs** for significant risk of flooding from various sources: New Cumnock, Kirkconnel, Moffat, Newcastleton, Langholm, Gretna and Kirtle Water catchment, Ecclesfechan – Annan, Lochmaben – Lockerbie, Powfoot, Dumfries and lower Nith catchment, Moniaive, Springholm, Southerness and Carsethorn, Dalbeattie, River Dee catchment, Kirkcudbright, Carsphairn, Creetown, Newton Stewart, Garlieston, Isle of Whithorn, Port William, Stranaer, and Portpatrick. Currently it is estimated that there are 16,000 people and 10,000 homes and businesses at risk from flooding. This is estimated to increase to 20,000 people and 13,000 homes and business by the 2080s due to climate change.
- The **Ayrshire** Flood Risk Management Plan 2022 to 2028[72] identifies **21 PVAs** for significant risk of flooding from various sources: Largs, Largs to Kilwinning, Upper Garnock catchment, Lower Irvine and Annick Water catchment, Irvine to Troon, Kilmarnock and Upper Irvine catchment, Pow Burn catchment, Pestwick and Ayr, River Ayr catchment, Ayr south, Ayr east, Dalrymple to Dalmellington, Drongan, Straiton, Cumnock, Catrine, Girvan, Barrhill, Isle of Arran, Great Cumbrae Island, and Kirkmichael. Currently it is estimated that there are 39,000 people and 23,000 homes and businesses at risk from flooding. This is estimated to increase to 47,000 people and 28,000 homes and business by the 2080s due to climate change.
- The **Tweed** Flood Risk Management Plan 2022 to 2028[73] identifies **12 PVAs** for significant risk of flooding from various sources: Biggar, Broughton, Peebles, Innerleithen and the Manoe Valley, Selkirk and the Ettrick Valley, Galashiels and Stow, Earlston, Coldstream, Kelso, Hawick, Bonchester Bridge, Jedburgh, and Bowmont Valley. Currently it is estimated that there are 14,000 people and 10,000 homes and businesses at risk from flooding. This is estimated to increase to 16,000 people and 11,000 homes and business by the 2080s due to climate change.
- The **Clyde & Loch Lomond** Flood Risk Management Plan 2022 to 2028[74] identifies 23 PVAs for significant risk of flooding from various sources; **six PVAs** are in this zone: East of Glasgow to Strathaven, Clyde catchment – Motherwell to Larkhall, Clyde catchment – Lanark to Lesmahagow, Symington and Coulter, Rutherglen, and White Cart Water catchment. Currently it is estimated that there are 170,000 people and 98,000 homes

[71] Scottish Environment Protection Agency (2022): Solway Flood Risk Management Plan
[72] Scottish Environment Protection Agency (2022): Ayrshire Flood Risk Management Plan
[73] Scottish Environment Protection Agency (2022): Tweed Flood Risk Management Plan
[74] Scottish Environment Protection Agency (2022): Clyde & Loch Lomond Flood Risk Management Plan

and businesses at risk from flooding. This is estimated to increase to 220,000 people and 130,000 homes and business by the 2080s due to climate change.

- The **Forth Estuary** Flood Risk Management Plan 2022 to 2028[75] highlights 30 PVAs for significant risk of flooding from various sources, **one PVA** is in this zone: Berwickshire Coast. Currently it is estimated that there are 115,000 people and 65,000 homes and businesses at risk from flooding. This is estimated to increase to 160,000 people and 89,000 homes and business by the 2080s due to climate change.

Flood risk areas in Zone T4 are shown in Figure 8.9 below.

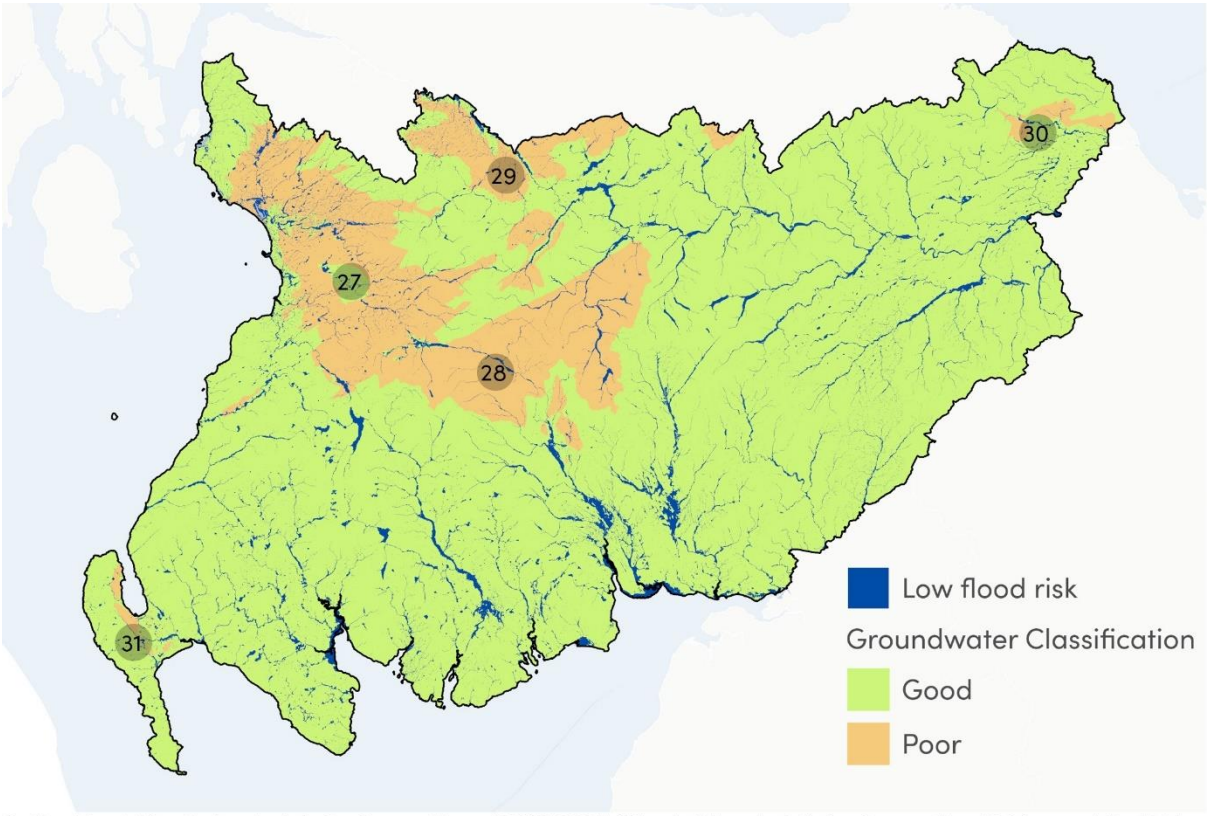

Figure 8.9: Flood risk areas within Zone T4

Groundwater conditions are classified as poor in the vicinity of Prestwick, Darvel Cumnock (**27**), Sanquhar (**28**), Larkhall (**29**), Duns (**30**), and Stranraer (**31**).

8.10. Key issues for Zone T4

The following key issues have been identified through the review of the baseline information for Zone T4:

- The zone has the potential to play a key role in **carbon storage**, including nationally important carbon-rich soils, deep peat and priority peatland habitat, as well as an extensive forestry resources.

[75] Scottish Environment Protection Agency (2022): Forth Estuary Flood Risk Management Plan

- The zone has an **ageing population**, with a higher percentage of people of retirement age and above.
- Particular **pockets of deprivation** include parts of Rutherglen, Hamilton, Larkhall and Kilmarnock. The zone also includes coastal towns and areas with high levels of deprivation, including Ayr, Irvine, Saltcoats and Ardrossan.
- The zone includes a growing **renewable energy** generation sector.
- Zone T4 has a rich and diverse **historic environment**, representing a wide range of eras from the Roman era, the Wars of Independence and subsequent struggles to maintain Scotland's independence, religious conflict and the Reformation, and industrialisation associated with the textile industry, coal and lead mining and iron production.
- The zone has a rich and diverse **archaeological resource**, including in the Esk Valley and upper Annandale, Leadhills, the Southern Uplands and the Cheviot Hills, and the Tweed Valley.
- A significant proportion of the zone's coastline is internationally designated for its **biodiversity** value.
- Higher quality **agricultural land** can be found around the River Teviot, the River Tweed, Ayrshire, and Dumfriesshire along the Solway Firth.
- **Five NSAs** are located in the zone, ranging from the coastal landscapes and seascapes of the Fleet Valley, East Stewartry Coast, and Nith Estuary to the inland landscapes of Upper Tweeddale, and Eildon and Leaderfoot.
- The Scottish Government is currently proposing to designate a **new National Park** in Galloway. Whilst the boundaries are yet to be determined, if designated, the new National Park would cover a significant amount of land in Zone T4.
- **10 waterbodies** in Zone T4 are classified as having a **'bad' ecological status**.
- Significant areas in the zone are at risk of fluvial and coastal **flood risk**.

9. Zone T5: North Eastern England

Overview of Zone T5

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for T5

9.1. Overview of Zone T5

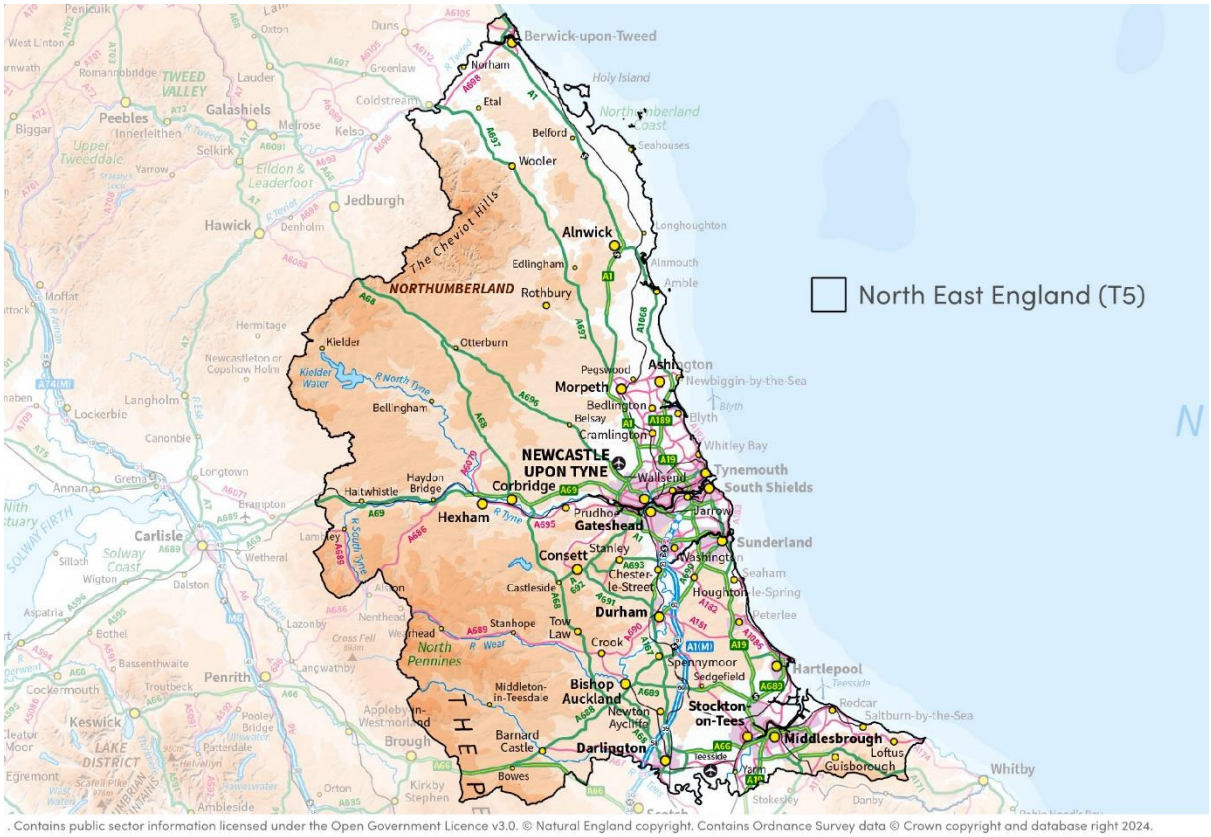

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Figure 9.1: Areas covered by Zone T5 – North East England

Zone T5 comprises the North East region of England.

The North East England Terrestrial Zone covers an area of **8,592 km²** (see Figure 9.1 above) and has a population of **2.6 million** (2021). It borders Scotland to the north, Cumbria to the west, Yorkshire to the south and the North Sea to the east.

The zone is a mixture of urban and rural. It contains a number of densely populated urban areas including the Newcastle upon Tyne, Sunderland and Gateshead conurbation, the Middlesborough, Stockton-on-Tees and Redcar urban area, and Darlington, Durham and Hartlepool. Whilst there are some densely populated urban areas, much of the zone has a strongly rural character, including in Northumberland and County Durham.

The Newcastle upon Tyne conurbation is the zone's main economic hub, with industries including finance and creative sectors and educational institutions alongside strong trade and logistics emanating from the ports. The post-industrial decline which has seen the shrinking of some industries has meant that some towns across the region have suffered from deprivation and under investment in growing industries.

The zone offers high value landscapes which are recognised for their mountainous and hilly topography and also include many areas which are internationally and nationally designated for their important ecological characteristics. The Northumberland coastline is also recognised for landscape and seascape value.

Hadrian's Wall, one of the most significant heritage assets in England, runs laterally through the centre of the zone. This plays an important role in the area's historic landscape and tourism industry.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

9.2. Air quality

Air quality issues in the zone are largely associated with traffic and transport. As highlighted by the location of the **four AQMAs** in the zone (see Figure 9.2 below), air quality concerns are largely concentrated within the urban areas of Newcastle upon Tyne (**1**), Gateshead (**1**), and Durham (**2**). These AQMAs are designated for exceedances in the annual mean concentration objective of 40µg/m^3 for NO_2.

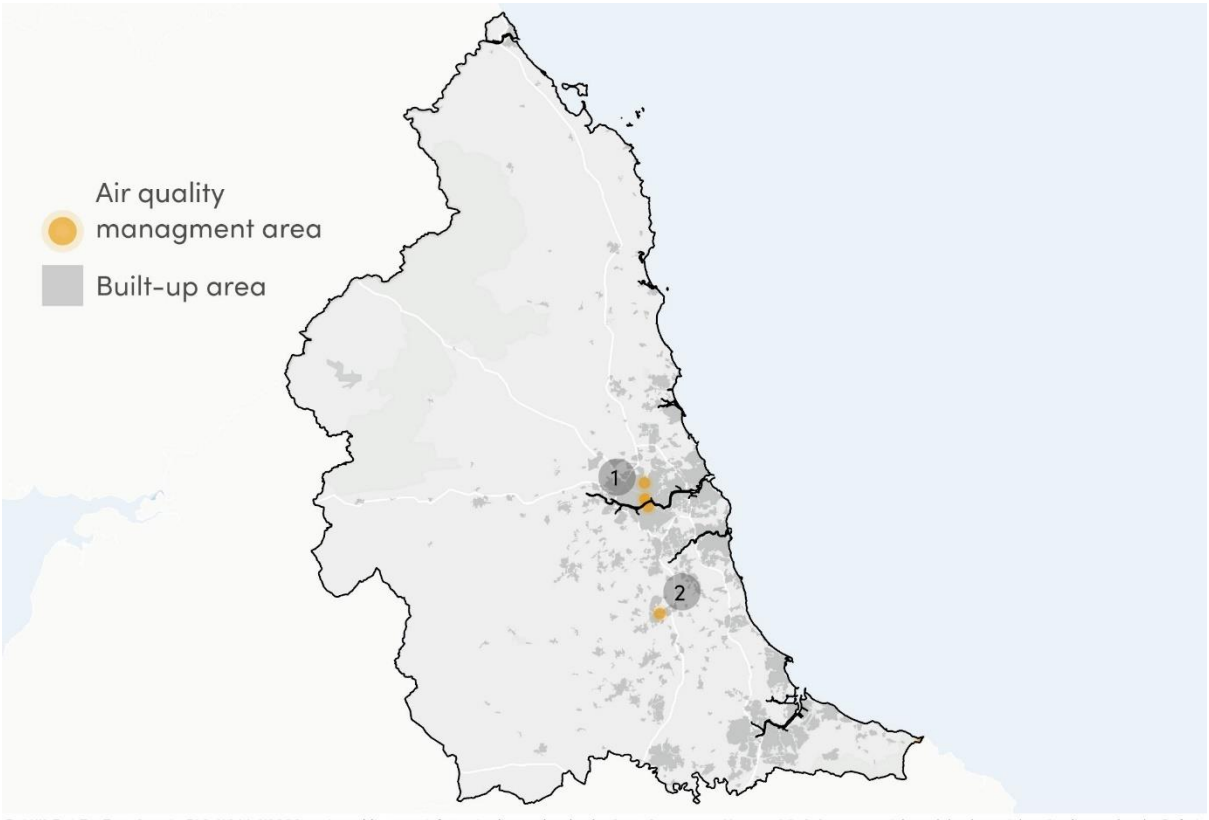

Figure 9.2: AQMAs in Zone T5

9.3. Climate change

In the North East, total greenhouse gas emissions amounted to **14,017.2 kt CO_2e** in 2022. The largest contributor to this total was the **transport sector** (approx. 29%), followed by the domestic sector (approx. 25.8%) and then the industrial sector (approx. 23.7%)[76].

The North East has stores of carbon across its area, including woodland (located across the region) and peatland (largely concentrated within the Northumberland National Park and the North Pennines National Landscape). There are also significant opportunities for **improving carbon stores**; for example, the Northumberland Peat Partnership estimates that there are 142,726 hectares of peat bog in Northumberland[77], and a number of restoration projects are being undertaken to recover lost or damaged areas.

Primary impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections (UKCP18)[78], winters in this zone are anticipated to be 1.25°C warmer between 2021-2040 and 2.91°C warmer between 2061-2080 in comparison to 1981-2000 (2.46°C). Warmer summers are also anticipated - with a 1.9°C increase anticipated for 2021-2040, and a 4.47°C increase for 2061-2080 in comparison to 1981-2000 (13.07°C). Winters in this zone are anticipated to be wetter (increasing to 2.81mm/day in 2061-2080 in comparison to 3.46mm/day in 1981-2000), and drier in the summer (decreasing to 2mm/day in 2061-2080 in comparison to 2.56mm/day in 1981-2000)[79]. This zone is at risk of coastal change, which is likely to be exacerbated by climate change.

Secondary impacts from climate change are largely linked to changes in temperature, humidity and precipitation. These can be widespread and impact upon ecosystems, people, settlements and infrastructure. Changes in precipitation patterns can lead to an increase in flood events or the occurrence of drought, which can impact on agriculture and natural resources. Increased temperatures can also result in heat-related human mortality, and cause species loss. Additionally, higher temperatures and the occurrence of heatwaves can aggravate air pollution events and also limit the function of key infrastructure – including compromising energy systems. The Intergovernmental Panel on Climate Change (IPCC) outlines that the energy sector is climate-exposed, indicating that energy infrastructure will become increasingly vulnerable if design standards do not account for changing climate conditions[80]. Infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems are viewed as the most feasible adaptation techniques – alongside energy generation diversification (i.e., a greater use of renewable energy)[81].

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[76] UK Government (2022): UK local authority and regional greenhouse gas emissions statistics
[77] Northumberland Wildlife Trust (no date): Northumberland Peat Partnership
[78] Met Office (no date): UKCP data
[79] Based on the RCP8.5 emissions scenario, which assumes there is fast population growth, low technical development rate, slow GDP growth, a massive increase in world poverty and high energy use and emissions. It also assumes no climate change mitigation or adaptation techniques are engaged with.
[80] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[81] IPCC (2019): Climate Change and Land

9.4. Community wellbeing

The population of the North East region is **2,647,013** (ONS Census 2021). It has a population density of 308.5 residents per square km, with higher densities in the Newcastle upon Tyne/Gateshead/Sunderland and Middlesborough/Stockton-on-Tees/Redcar conurbations and Durham, Darlington and Hartlepool. In contrast, a large proportion of Northumberland and County Durham have very low population densities and a distinctly rural character.

In terms of its age profile, the North East zone has a higher percentage of people of **retirement age** and above, at 20.4% compared to the English average of 18.3% (see Figure 9.3 below). This age profile pattern is likely to persist in the medium term, as the zone also has a higher than English average proportion of people aged 50 to 64 (ONS Census 2021).

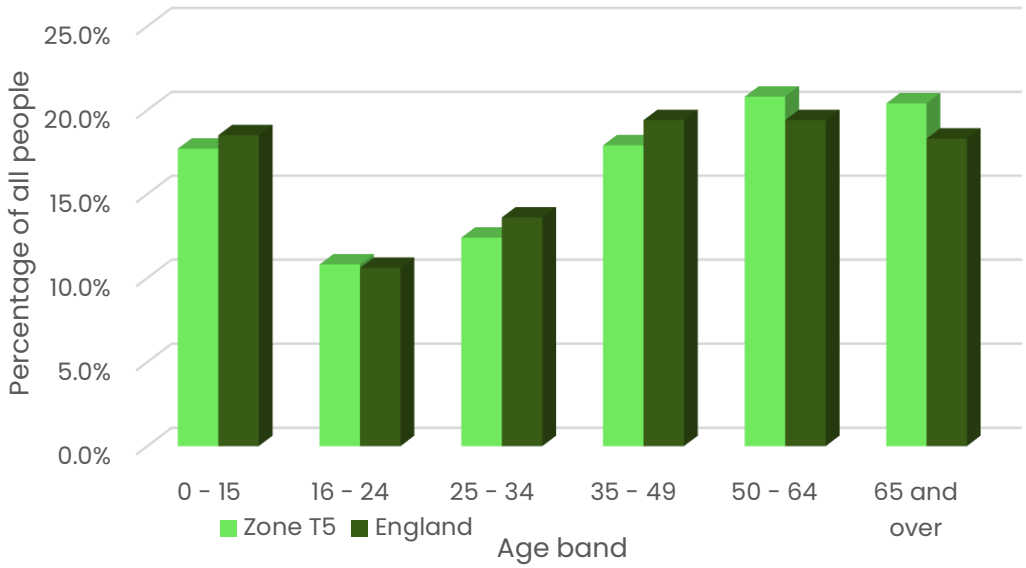


Figure 9.3: Age profile of Zone T5 (source ONS Census 2021)

IMD data from 2019 shows that the North East includes significant clusters of the **most deprived** communities in England, including large parts of Newcastle upon Tyne, Gateshead, Middlesborough, Sunderland, Darlington, Hartlepool and Stockton-on-Tees.

Higher levels of deprivation can also be found in some of the coastal towns in the region, including Blyth, Redcar and South Shields. There is also persistent deprivation within the former coalmining and steel working communities in the region. This includes the area around Consett, Stanley and Catchgate; the area around Peterlee, Easington, Shotton Colliery and Blackhall Colliery; a corridor between Peterlee and Ferryhill; a corridor along the A182 encompassing South Hetton, Hetton-le-Hole, and Houghton-le-Spring; and the area around Shildon.

Rural deprivation linked to **accessibility** to services, facilities and amenities is also an issue for some communities in the region, including in rural Northumberland and County Durham.

Key 'traditional' economic sectors in the zone have historically included agriculture, steel production and coal mining. Newcastle upon Tyne, Sunderland, and Hartlepool have also

been traditional centres for shipbuilding, but the maritime industry is no longer a major industry in this area. Current economic sectors also include digital and creative industries, energy generation and retail and hospitality sectors.

In Zone T5, the industries with the **highest regional GVA in 2022**[82] were the services sector and production sector.

The region has an excellent **rights of way network**, which is popular for nature-based recreation, leisure and tourism. Popular rights of way include paths along the heritage coast and in Northumberland National Park. The zone also partially includes the Hadrian's Wall Path, Pennine Way and Cleveland Way National Trails. The Pennine Way National Trail continues south through the Yorkshire Dales to the Peak District.

9.5. Cultural heritage and historic environment

The North East of England has a rich and diverse historic environment and cultural heritage resource. The distribution and diversity of heritage features in the zone reflect the historic evolution of the region from prehistoric times, incorporating:

- Bronze Age settlement.
- Occupation and settlement by the Romans, Anglo-Saxons and Vikings.
- The development of the area as an ecclesiastical centre.
- Military fortifications associated with the frontier between England and Scotland.
- Rapid industrialisation and urbanisation associated with the coal mining industry, ship building and manufacturing.

[82] ONS (2024): Regional gross value added (balanced) by industry: all ITL regions

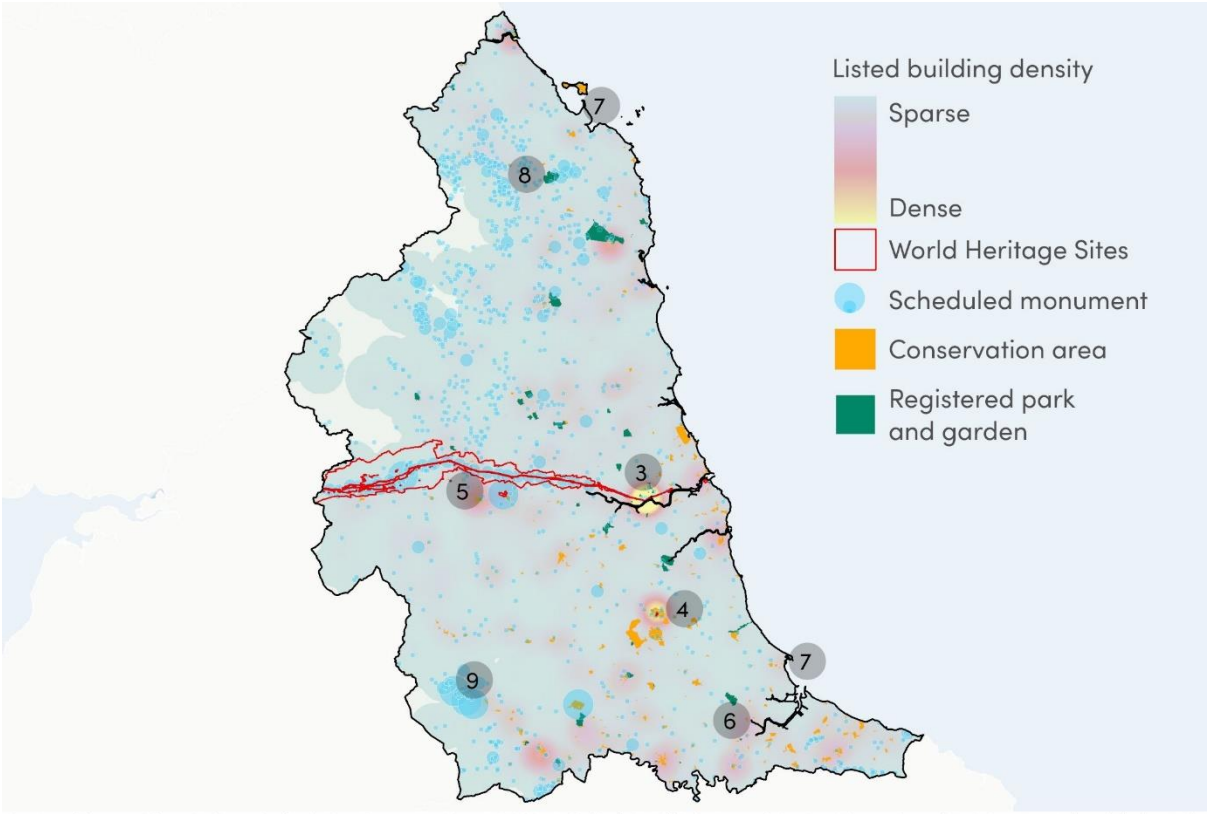


Figure 9.4: Designated heritage assets within Zone T5

Concentrations of historic environment designations in the zone (see Figure 9.4 above) include (but are not limited to):

- **Newcastle** (**3**): Reflecting its diverse Roman, ecclesiastical, Norman, medieval and Georgian heritage, and its subsequent industrial heritage associated with ship building, port activities, the railways, manufacturing and as a centre of the coal trade.
- **Durham** (**4**): Including associated with its castle and cathedral.
- **Hadrian's Wall** (**5**): Features and areas of significance associated with the Roman frontier
- **County Durham** (**6**): Industrial mining heritage associated with the Great Northern Coalfields.
- **Coastline** (**7**): including associated with the defensive fortifications around Berwick-upon-Tweed, Bamburgh Castle, and the monastic history of the Lindisfarne area, and further south, industrial heritage associated with port and coal mining activities.

Two WHSs are present in Zone T5, as follows:

- **Frontiers of the Roman Empire** (**5**): The zone contains the eastern part of Hadrian's Wall, which comprised part of the 'Roman Limes'. The Roman Limes represents the border line of the Roman Empire at its greatest extent in the 2nd century AD. It stretched over 5,000 km from the Atlantic coast of northern Britain, through Europe to the Black Sea, and from there to the Red Sea and across North Africa to the Atlantic coast. The remains of the Limes today consist of vestiges of built walls, ditches, forts,

fortresses, watchtowers and civilian settlements. Certain elements of the line have been excavated, some reconstructed and a few destroyed. The 118-km-long Hadrian's Wall (UK) was built on the orders of the Emperor Hadrian c. AD 122 at the northernmost limits of the Roman province of Britannia. It is a striking example of the organization of a military zone and illustrates the defensive techniques and geopolitical strategies of ancient Rome.

- **Durham Castle and Cathedral** (**4**): Durham Cathedral was built between the late 11th and early 12th century to house the bodies of St. Cuthbert (634-687 AD) (the evangeliser of Northumbria) and the Venerable Bede (672/3-735 AD). It attests to the importance of the early Benedictine monastic community and is the largest and finest example of Norman architecture in England. The innovative audacity of its vaulting foreshadowed Gothic architecture. The Cathedral lies within the precinct of Durham Castle, an ancient Norman fortress which was the residence of the prince-bishops of Durham. The site is significant because of the exceptional architecture demonstrating architectural innovation and the visual drama of the Cathedral and Castle on the peninsula, and for the associations with notions of romantic beauty in tangible form.

The North East of England has a rich **archaeological resource**. Particular concentrations of scheduled monuments include in the following areas:

- **Hadrian's Wall:** The area has a significant Roman period archaeological resource associated with its role as part of the Roman Lines (discussed above).
- **Cheviot Hills** (**8**): The Cheviot Hills in Northumberland have large concentrations of Bronze Age settlements and associated features such as burial grounds and cairns. It also has a large concentration of native homesteads and farmsteads dating from the Roman period.
- **Upper Teesdale** (**9**): The area contains a complex area of multi-period archaeological remains, consisting of: Bronze Age burial cairns, hut circles and burnt mounds; Roman period native settlements; early medieval settlements with associated field systems, clearance cairns and boundary banks; and remains from the medieval iron industry including mine workings.

9.6. Ecology and biodiversity

Priority habitats are present across the region and represent a diverse range of habitats and support a wide variety of species. Particularly extensive areas of priority habitat are shown in Figure 9.5 overleaf, and include:

- Upland heathland, blanket bog, good quality semi-improved grassland, and purple moor grass and rush pastures in Northumberland National Park (**10**)
- Upland heathland and blanket bog in the North Pennine Moors (**11**)

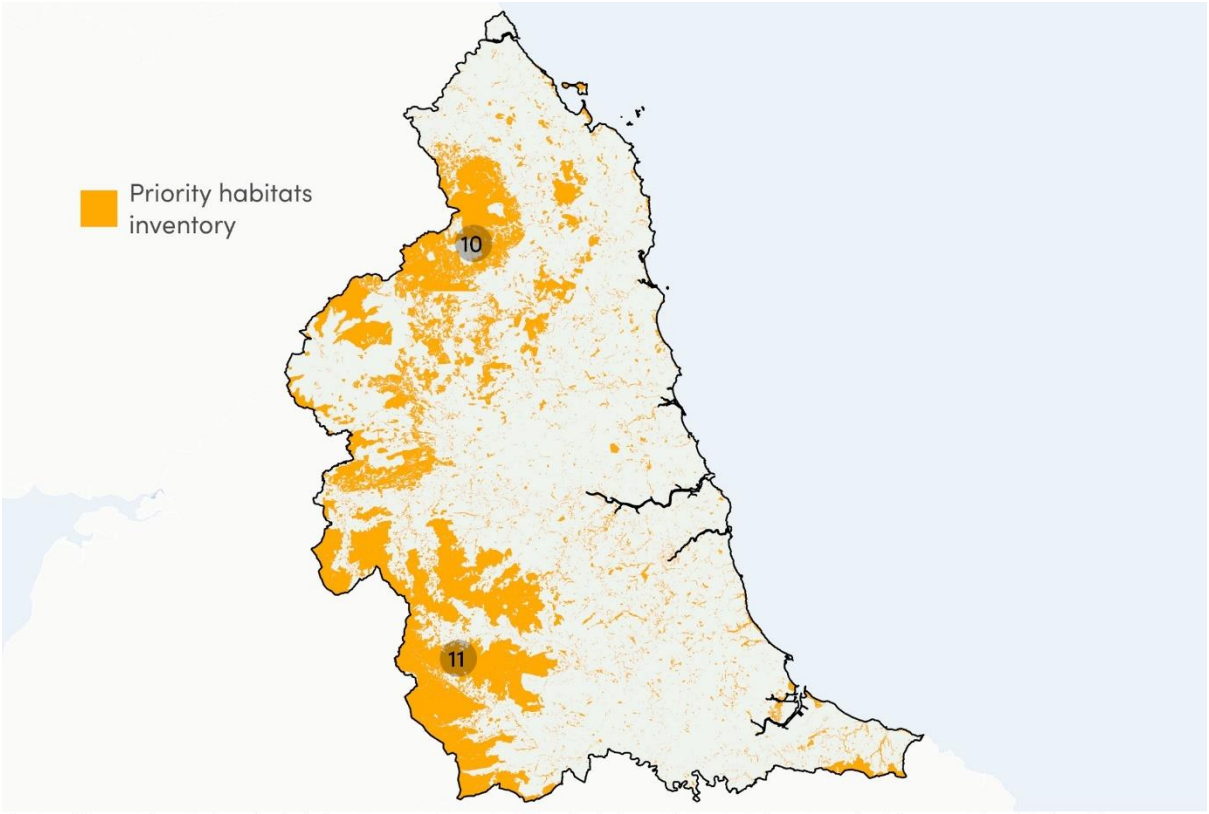


Figure 9.5: Cover of priority habitats in Zone T5

Overall, the area covered by **SAC** designations (including possible SACs) is 80,131 ha (9.3% of the zone); the area covered by **SPA** designations (including potential SPAs) is 73,352 ha (8.54% of the zone); and the area covered by **Ramsar site** designations (including proposed Ramsar sites) is 1,646 ha (0.2% of the zone). Internationally designated sites for biodiversity in Zone T5, as shown in Figure 9.6 overleaf, include:

- The North Pennine Moors SAC and SPA **(12)**
- Border Mires, Kielder-Butterburn SAC **(13)**
- Simonside Hills SAC (**14**)

The area covered by **SSSI** designations is 106,678 ha (12.4% of the zone). Nationally designated sites for biodiversity in Zone T5, as shown in Figure 9.6 overleaf, include:

- Kielderhead and Emblehope Moors SSSI and Whitelee Moor NNR **(13)**
- Simonside Hills SSSI (**14**)
- The Cheviot SSSI (**15**)
- Bewick and Beanley Moors SSSI (**16**)

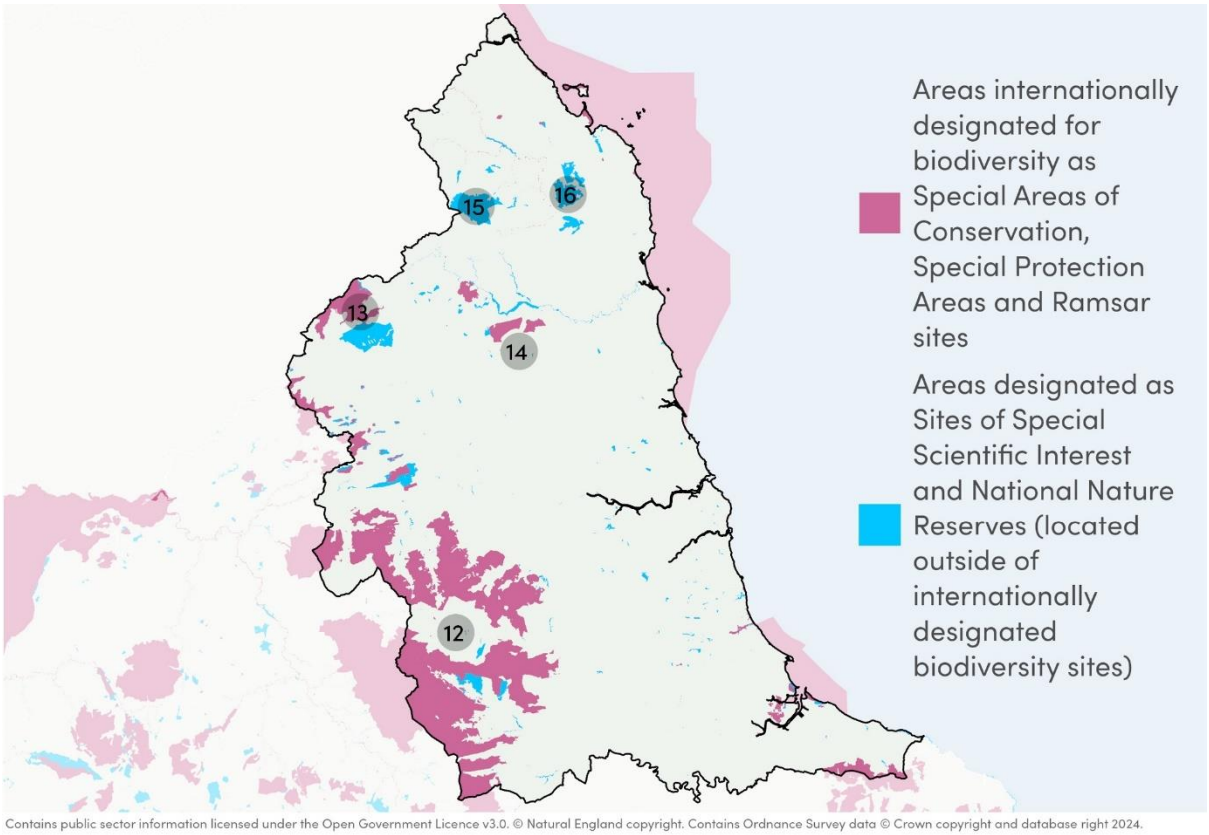


Figure 9.6: Internationally and nationally designated sites for biodiversity in Zone T5

The percentage of the zone covered by **ancient woodland** is 1.3%, totalling 11,201 ha.

9.7. Land and soil resources

With regard to the Agricultural Land Classification (ALC), the large spread of uplands associated with the North Pennines (**17**), and Northumberland National Park (**18**), and forested areas of the north-west of the zone (**19**) (see Figure 9.7 overleaf) mean that much of the Zone T5 is of poorer agricultural quality, with 55% of the zone comprised of **grades 4 and 5** land. The urban areas of Newcastle (**20**) and Middlesborough (**21**) can be found in the east and south-east, in coastal areas, with a large north-south band (**22**) of **grade 3** agricultural land stretching from the top to bottom of the zone. The zone does not contain any of the highest (grade 1) quality agricultural land, and only has a small amount (3%) of **grade 2** land; this is found in the south (west of Darlington) **(23)**, along the lowlands and flood plains of the River Tyne (**24**) and along the Scottish border and lowlands associated with the River Tweed (**25**) and River Till (**26**).

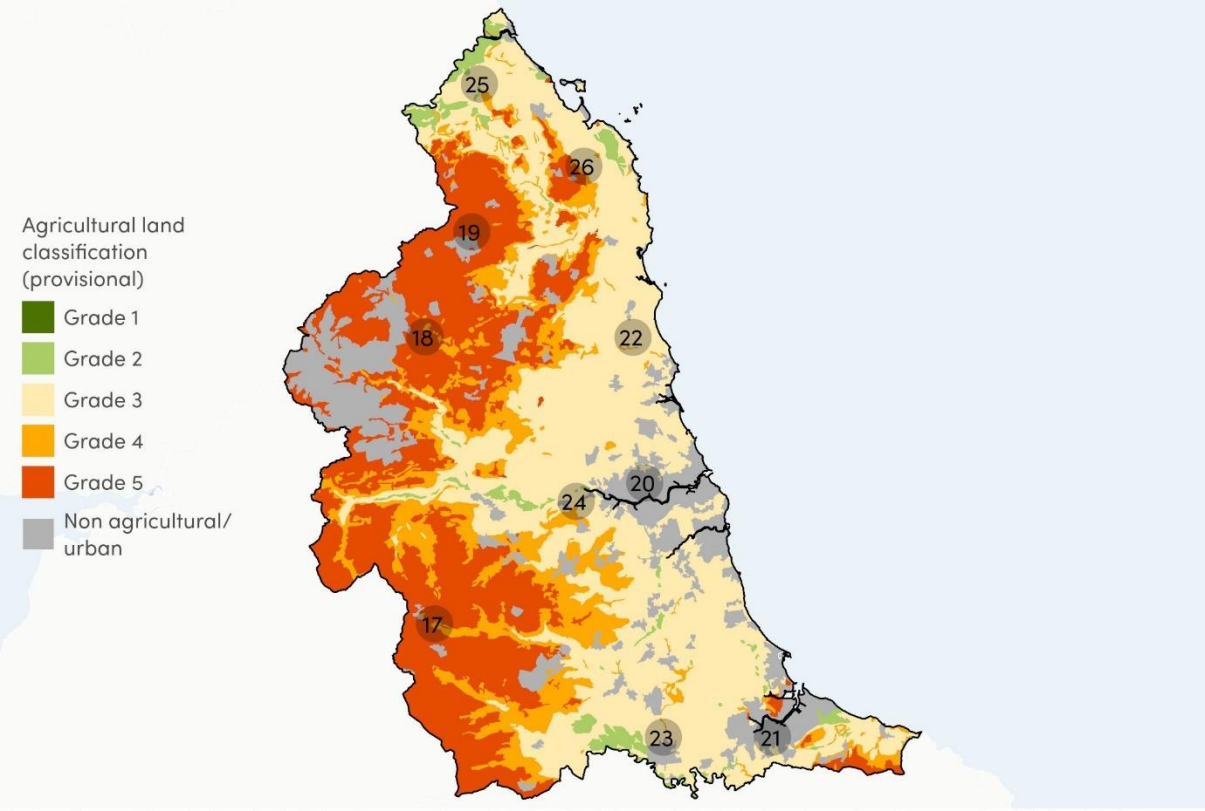


Figure 9.7: Agricultural land classification across Zone T5

9.8. Landscape and seascape

Zone T5 has a diverse range of landscapes, representing a significant breadth of landscape and seascape types which reflect the interplay of the area's topography, geology, biodiversity, land uses and cultural heritage.

To the north of Zone T5, the Cheviot Hills rise gently along the Scottish border, providing a rugged backdrop of **heather moorland** and **fertile valleys**. To the east of the Zone, the landscape is characterised by a dramatic coastline, featuring **sandy beaches**, **rocky cliffs**, and **historical towns** such as Bamburgh and Alnwick. This character of the area is also influenced by its significant medieval history, reflected by the presence of many **historic castles**.

The River Tyne flows through Newcastle, a historic **industrial hub**, whilst the Wear and Tees pass through industrial heartlands of Sunderland, Darlington, and Middlesbrough. Industries such **coal mining**, **shipbuilding**, and **steel production** have particularly shaped the landscape across the Zone.

A significant proportion of the Zone T5 (29.4%) is covered by National Park or National Landscape status: the percent of the zone covered by National Parks is 12.9% (111,258 ha); and the percent covered by National Landscapes is 16.5% (141,636 ha).

Northumberland National Park (see Figure 9.8 overleaf) is an upland National Park located in North East England. Its special qualities include expansive, unspoilt moorlands with far-reaching views and a sense of remoteness and wildness; tranquil valleys; diverse

flora and fauna; a rich geological heritage; timelessness; tranquillity; an extensive network of rights of way; traditional farming practices; clean water; significant archaeological sites including Hadrian's Wall; and many historic buildings and structures.

North York Moors National Park (see Figure 9.8 overleaf) is also an upland National Park located partly within the zone. Its special qualities include sweeping heather moorland; a coastline with dramatic cliffs and secluded bays; ancient woodlands; villages; dark skies and tranquillity; an extensive network of public rights of way; traditional farming practices; clean water; and many historic buildings and structures.

Two National Landscapes (see Figure 9.8 overleaf) are located wholly or partly within Zone T5. These range from the upland landscapes of the **North Pennines**, with their open heather moors, upland dales, and notable areas such as Cross Fell, High Cup Nick, and the Allen Valleys, to the coastal landscapes of the **Northumberland Coast**, featuring rugged cliffs, sandy beaches, and notable areas such as Bamburgh, Lindisfarne, and the Farne Islands.

Heritage coasts have been established to conserve the best stretches of undeveloped coast in England. Reflecting the zone's distinctive seascapes, a small proportion of Zone T5 (0.13%) is covered by heritage coast.

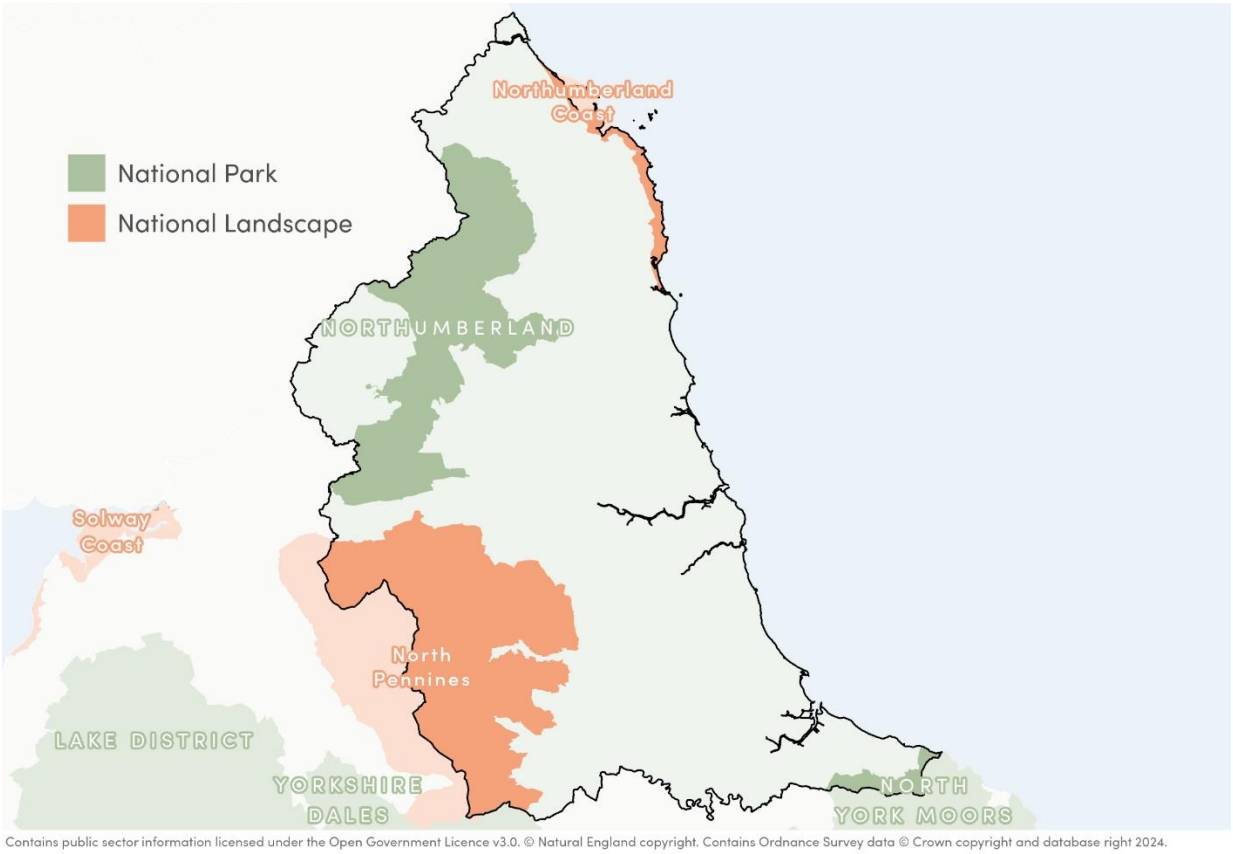


Figure 9.8: Designated landscapes within Zone T5

9.9. Water

According to the WFD river classification data (2019), **10 waterbodies** in Zone T5 are classified as having a **'bad' ecological status**. These are:

- Carrs from Source to Skerne
- Castle Eden Burn from Source to North Sea
- Darden Burn Catchment (trib of South Tyne)
- Middle Gill Beck from Source to Kilton Beck
- Neasham Stell Catchment (trib of Tees)
- North Burn from Source to Claxton Beck
- Piercebridge Beck from Source to Tees
- Skerne from Carrs to Woodham Burn
- Stainsby Beck Catchment (trib of Tidal Tees)
- Sudburn Beck from Source to Langley Beck

The River Basin District Flood Risk Management Plans that cover Zone T5, and the **Flood Risk Areas (FRAs)** which falls within the zone, are set out below:

- The **Northumbria** River Basin District Flood Risk Management Plan 2021 to 2027[83] identifies **one FRA** for significant risk of flooding from surface water: Newcastle Upon Tyne. It does not identify any FRAs for significant risk of flooding from main rivers and the sea.
- There are no FRAs within the **Solway Tweed** River Basin District according to the Flood Risk Management Plan 2021 to 2027.[84]

As highlighted in the Northumbria River Basin District River Basin Management Plan[85], particular **challenges facing the water environment** include: climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

Areas of **Flood Zone 2** in Zone T5 are shown in Figure 9.9 overleaf.

[83] UK Government (2016): Northumbria River Basin District Flood Risk Management Plan
[84] Uk Government (2016): Solway Tweed River Basin District Flood Risk Management Plan
[85] UK Government (2022): Northumbria River Basin District River Management Plan

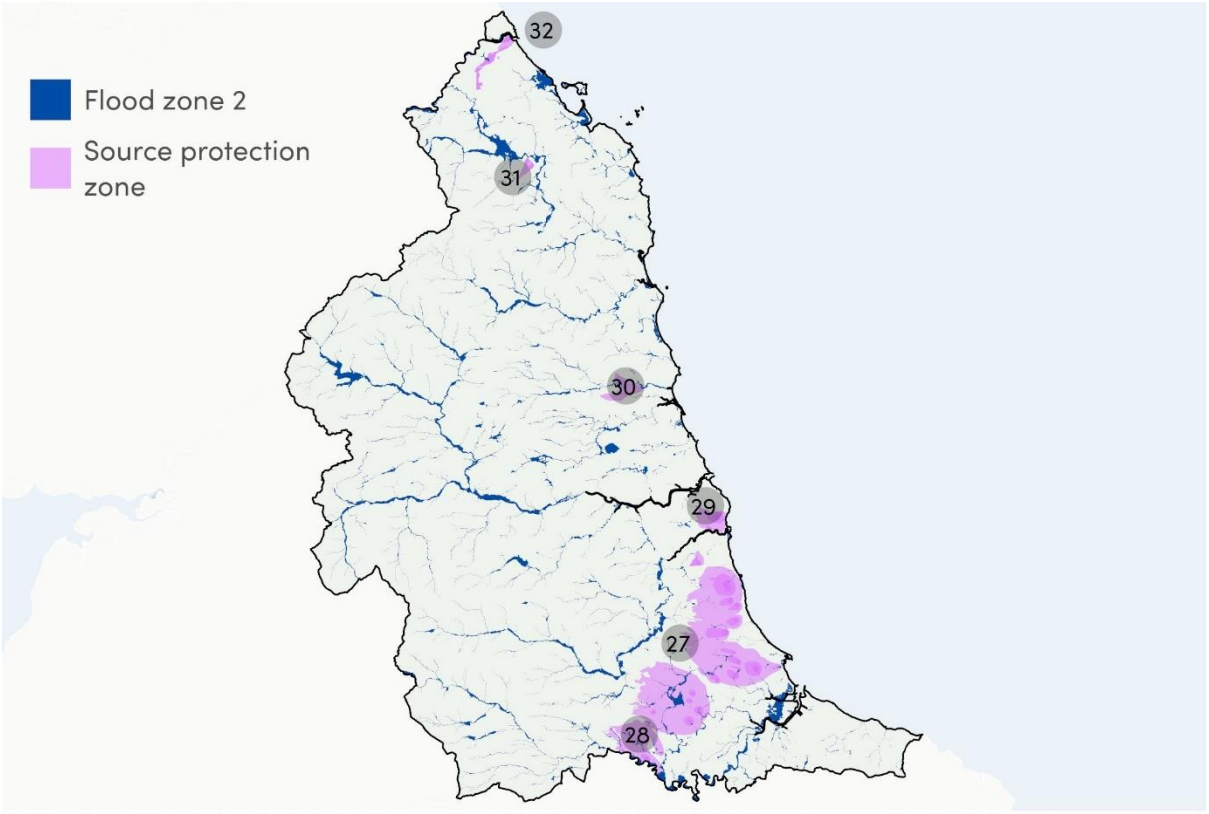


Figure 9.9: Areas of Flood Zone 2 and SPZs and NVZs within Zone T5

Source Protection Zones (SPZs) are mostly present in the vicinity of Durham (**27**), Darlington (**28**), Newcastle Upon Tyne (**29**), Morpeth (**30**), Wooler (**31**), and Berwick-upon-Tweed (**32**).

9.10. Key issues for Zone T5

The following key issues have been identified through the review of the baseline information for Zone T5:

- The North East of England has stores of carbon across its area, including woodland and peatland (largely concentrated within the Northumberland National Park and the North Pennines National Landscape). There are also significant opportunities for improving **carbon stores** in the region.
- The North East of England includes significant clusters of the **most deprived** communities in England. In addition to the within Newcastle upon Tyne, Gateshead, Middlesborough, Sunderland, Darlington, Hartlepool and Stockton-on-Tees, there are significant deprivation issues in former coal mining and steel working communities in the region and in some coastal areas.
- Deprivation linked to **accessibility** to services, facilities and opportunities is a significant issue for some rural parts of Northumberland and County Durham.
- The distribution and diversity of **heritage features** in the zone reflect the historic evolution of the region from prehistoric times, incorporating Bronze Age settlement; occupation and settlement by the Romans, Anglo-Saxons and Vikings; the

development of the area as an ecclesiastical centre; military fortifications associated with the frontier between England and Scotland; and rapid industrialisation and urbanisation associated with the coal mining industry, ship building and manufacturing.

- **Hadrian's Wall** is a key heritage asset which bisects the region from west to east.
- The region has a rich **archaeological resource**, with particular concentrations of archaeological finds in the vicinity of Hadrian's Wall, the Cheviots and Upper Teesdale.
- A significant proportion of the zone's coastline is internationally designated for its biodiversity value.
- The zone has a distinctive landscape and seascape character and incorporates two **National Parks** and two **National Landscapes**.
- **10 waterbodies** in Zone T5 are classified as having a **'bad' ecological status**.
- Particular challenges to the **water environment** include climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

10. Zone T6: North West England

Overview of Zone T6

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for T6

10.1. Overview of Zone T6

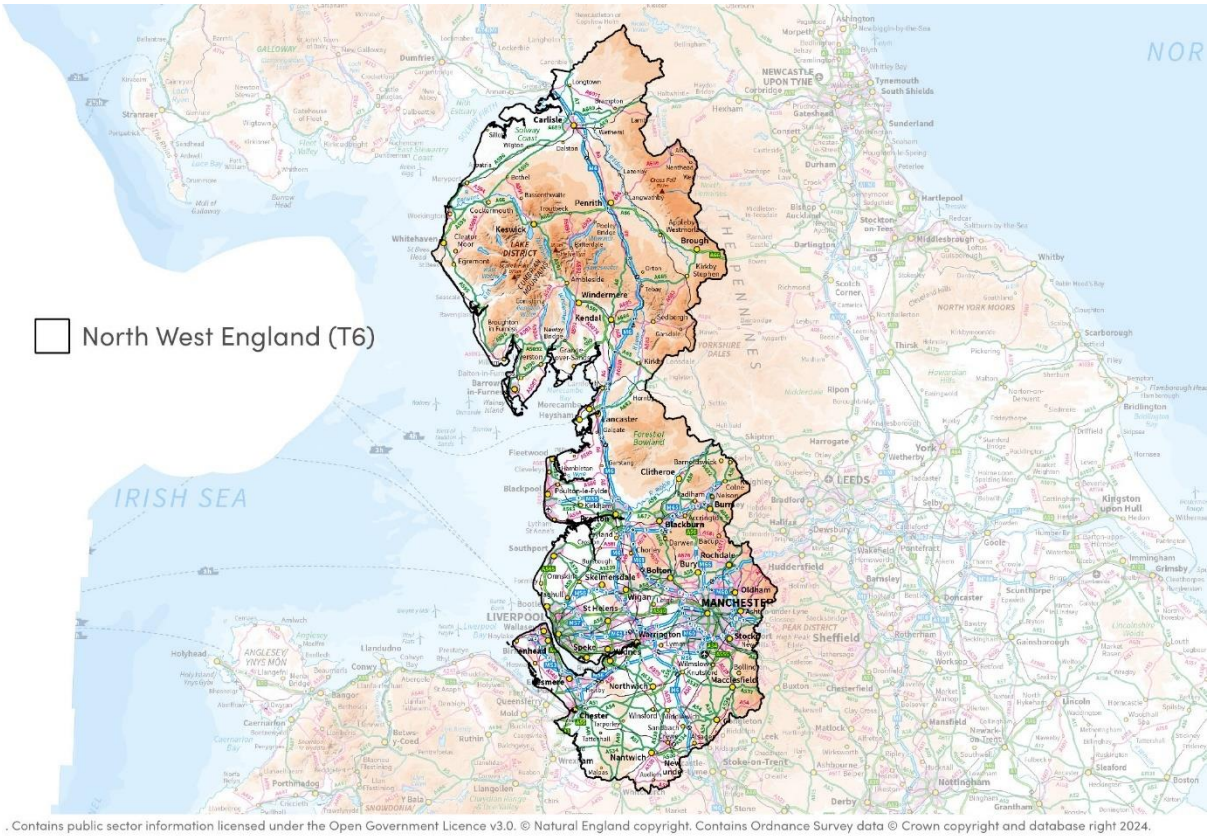


Figure 10.1: Area covered by Zone T6 – North West England

Zone T6 comprises the North West region of England.

The North West England Terrestrial Zone covers an area of **14,164 km²** and has a population of **7.4 million** (2021). It has a coastline on the Irish Sea and a land border with Wales and Scotland. It contains a diverse range of landscapes which offer some distinctions between the north and the south of the zone. The area includes a number of major cities, including Manchester and Liverpool and their wider city regions, as well as smaller cities and towns, including, Chester, Preston, Blackburn, Lancaster, Blackpool and Carlisle.

The southern parts of the zone are home to the majority of the zone's population, including within the Manchester and Liverpool City Regions. These areas contain a significant amount of cultural and built heritage as well as hosting large amounts of industries linked to educational institutions, media, technology, finance and trade and logistics (associated with the port in Liverpool).

The natural environment plays a strong role across the landscape of the north west of England. There are multiple landscape designations, with three National Parks and four National Landscapes which cover forested and mountainous areas as well as dales. Many of these natural features and designated internationally and nationally for their ecological value. The coastlines also designated for their ecological significance and cover some high valued coastal landscapes, including on the Wirral Peninsula, at Morecambe Bay, and along the Solway Coast in Cumbria. Hadrian's Wall, one of the most significant heritage assets in England, runs laterally through the north of the zone. This plays an important role in the historic landscape of the area.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

10.2. Air quality

Air quality issues in the zone are largely associated with traffic and transport. As highlighted by the location of the **61 AQMAs** in the zone, the majority of the AQMAs are largely focused within and surrounding the urban areas of Liverpool and Manchester (see Figure 10.2 overleaf). These are primarily designated for exceedances in the annual mean concentration objective of 40µg/m^3 for NO_2, though it is noted that monitoring also occurs for PM_{10} in Sefton (**1**) due to exceedances in the 24 hour mean concentration objective of 50µg/m^3 for this pollutant. This is linked to natural sources and human sources such as industrial emissions and dust linked to vehicle movements.[86] Additionally, one AQMA **(2)** declared by Cheshire West and Chester Council is designated for exceedances in the 15-minute average for SO_2 – 266µg/m^3 – is linked to industrial emissions.[87]

[86] Sefton Metropolitan Borough Council (2024): Annual Status Report 2024

[87] Cheshire West and Chester Council (2024): 2024 Air Quality Annual Status Report (ASR)

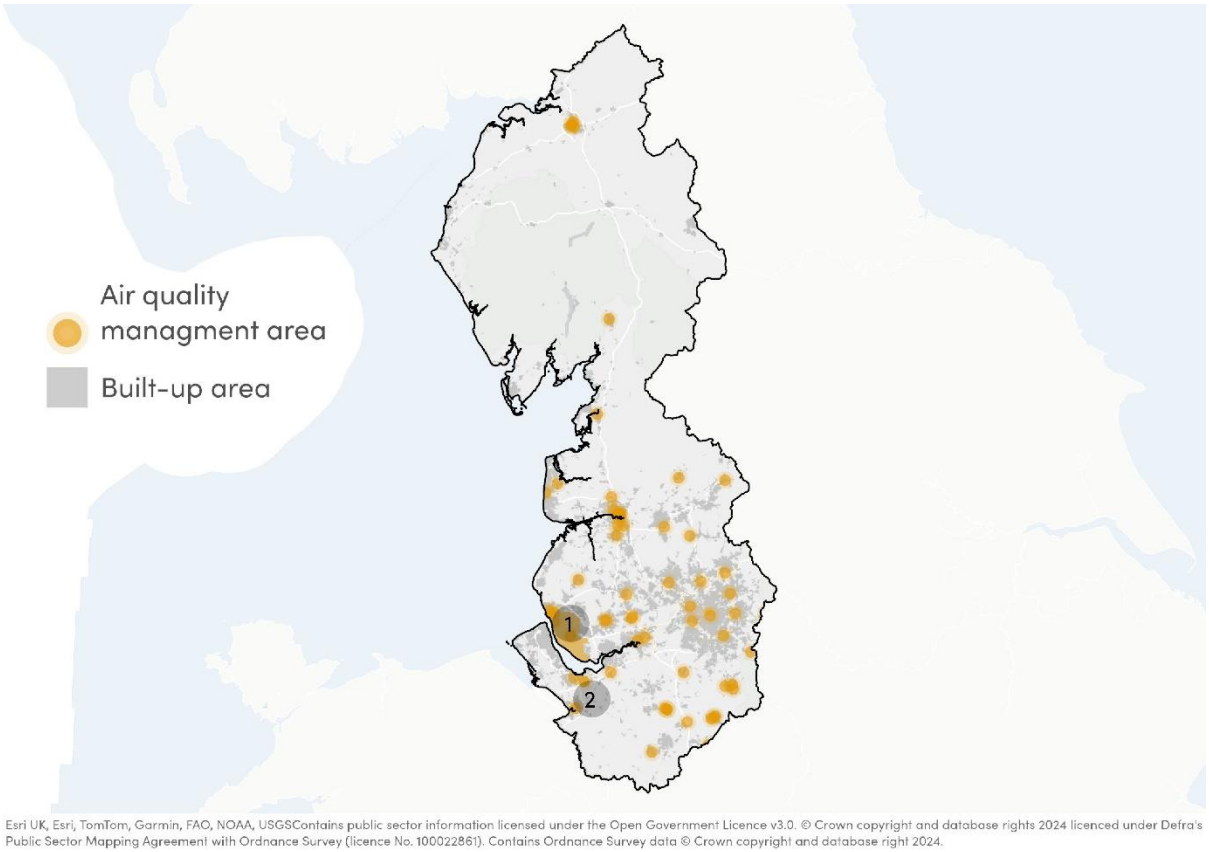


Figure 10.2: AQMAs in Zone T6

10.3. Climate change

In the North West, total GHG emissions amounted to **40,593 kt CO_2e** in 2022. The largest contributor to this total was the **transport sector** (approx. 30.1%), followed by the domestic sector (approx. 22.9%) and the industry sector (approx. 17.1%)[88].

The North West has **stores of carbon** across its area, including woodland (located across the region) and peatland (largely concentrated within the Lake District National Park, the Yorkshire Dales National Park, and the multiple National Landscapes). The Lancashire Peat Partnership reports that there are 335,000 hectares of peatland across lowland Lancashire, Greater Manchester, and North Merseyside alone. It is also part of the Great North Bog, which stores up to 400 million tonnes of carbon[89].

Primary impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections (UKCP18)[90], winters in this zone are anticipated to be 1.22°C warmer between 2021-2040 and 2.93°C warmer between 2061-2080 in comparison to 1981-2000 (3.19°C). Warmer summers are also anticipated - with a 1.91°C increase anticipated for 2021-2040, and a 4.5°C increase for 2061-2080 in comparison to 1981-2000 (13.74°C).

[88] UK Government (2022): UK local authority and regional greenhouse gas emissions statistics
[89] The Wildlife Trust for Lancashire, Manchester & North Merseyside (no date): Lancashire Peat Partnership
[90] Met Office (no date): UKCP data

Winters in this zone are anticipated to be wetter (increasing to 6.79mm/day in 2061-2080 in comparison to 5.56mm/day in 1981-2000), and drier in the summer (decreasing to 2.47mm/day in 2061-2080 in comparison to 3.55mm/day in 1981-2000)[91]. This zone could be at risk of coastal change, which could be exacerbated by climate change.

Secondary impacts from climate change are largely linked to changes in temperature, humidity and precipitation. These can be widespread and impact upon ecosystems, people, settlements and infrastructure. Changes in precipitation patterns can lead to an increase in flood events or the occurrence of drought, which can impact on agriculture and natural resources. Increased temperatures can also result in heat-related human mortality, and cause species loss. Additionally, higher temperatures and the occurrence of heatwaves can aggravate air pollution events and also limit the function of key infrastructure – including compromising energy systems. The Intergovernmental Panel on Climate Change (IPCC) outlines that the energy sector is climate-exposed, indicating that energy infrastructure will become increasingly vulnerable if design standards do not account for changing climate conditions[92]. Infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems are viewed as the most feasible adaptation techniques – alongside energy generation diversification (i.e., a greater use of renewable energy)[93].

10.4. Community wellbeing

The population of the North West region is **7,417,397** (ONS Census 2021). It has a population density of 525.8 residents per square km, which is the second highest of any English region. The population density varies throughout the zone with higher densities in Manchester, Liverpool and Blackpool and lower densities in Cumbria.

The age profile in the North West zone is similar to the English average (see Figure 10.3 below). Most of the population (62.4%) falls within the **working age** bands, with 18.8% of the population aged 15 and under and 18.7% aged over 65 (Census 2021).

[91] Based on the RCP8.5 emissions scenario, which assumes there is fast population growth, low technical development rate, slow GDP growth, a massive increase in world poverty and high energy use and emissions. It also assumes no climate change mitigation or adaptation techniques are engaged with.
[92] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[93] IPCC (2019): Climate Change and Land

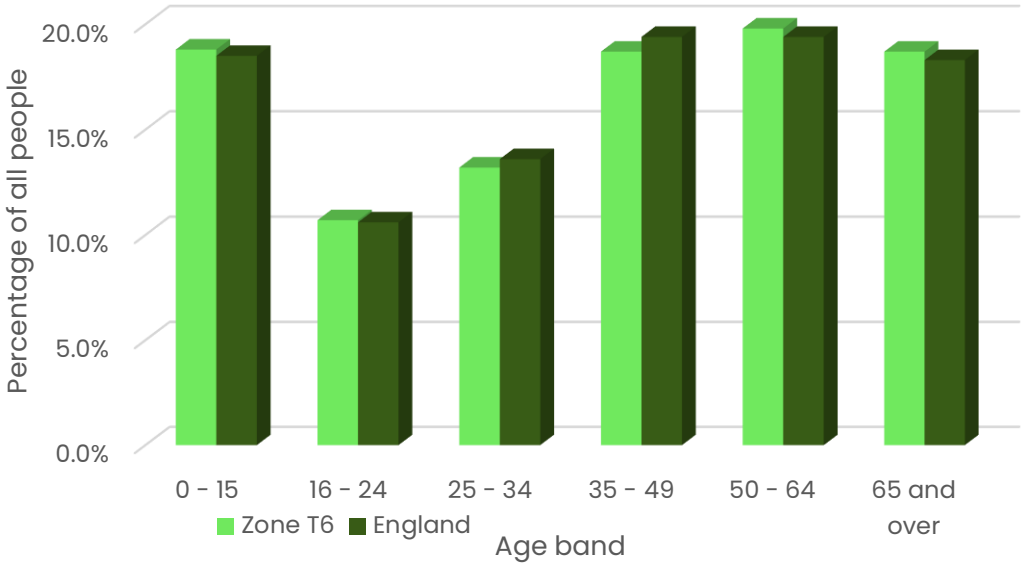


Figure 10.3: Age profile of Zone T6 (source ONS Census 2021)

IMD data from 2019 shows that the North West includes some of the **most deprived** communities in England, including parts of Greater Manchester, Liverpool, Birkenhead, Warrington and St Helens. The zone also includes coastal towns and areas with high levels of deprivation, including Blackpool and Morecambe. There are also pockets of deprivation scattered throughout the populated areas of the zone.

There are some more affluent pockets with communities amongst the least deprived in the southern part of the zone, including the southern part of Greater Manchester and the southern part of Cheshire.

Key 'traditional' economic sectors in the zone include textile manufacturing, steel production and coal mining. Rural areas, especially to the north of the region have a strong agricultural heritage. Current economic sectors include growing advanced manufacturing, financial and professional services, digital and creative industries, and retail and hospitality sectors.

In Zone T6, the industries with the **highest regional GVA in 2022**[94] were the services sector and production sector.

The region has a comprehensive **rights of way network** which provides access and opportunities for leisure and nature-based recreation between settlements and provides access to the countryside and national parks. Paths between urban areas and the countryside include the Greater Manchester Ringway and the Lancashire Trail. Paths and bridleways in and around the national parks are also popular for tourism. The northern part of the zone includes the Hadrian's Wall Path National Trail. The Pennine Way National Trail runs partially within the east of the zone and continues along the length of the Pennines. The Pennine Bridleway National Trail also runs to the east of the zone.

[94] ONS (2024): Regional gross value added (balanced) by industry: all ITL regions

10.5. Cultural heritage and historic environment

The North West of England has a rich and diverse historic environment and cultural heritage resource. The distribution and diversity of heritage features reflect the historic evolution of the region from prehistoric times, incorporating:

- Neolithic and early Bronze Age settlement.
- Occupation and settlement by the Romans.
- Vikings incursions.
- Norman settlement and agricultural development.
- Frontier settlements between England and Scotland and Wales.
- Agricultural development.
- Rapid industrialisation and urbanisation as a centre for the industrial revolution.

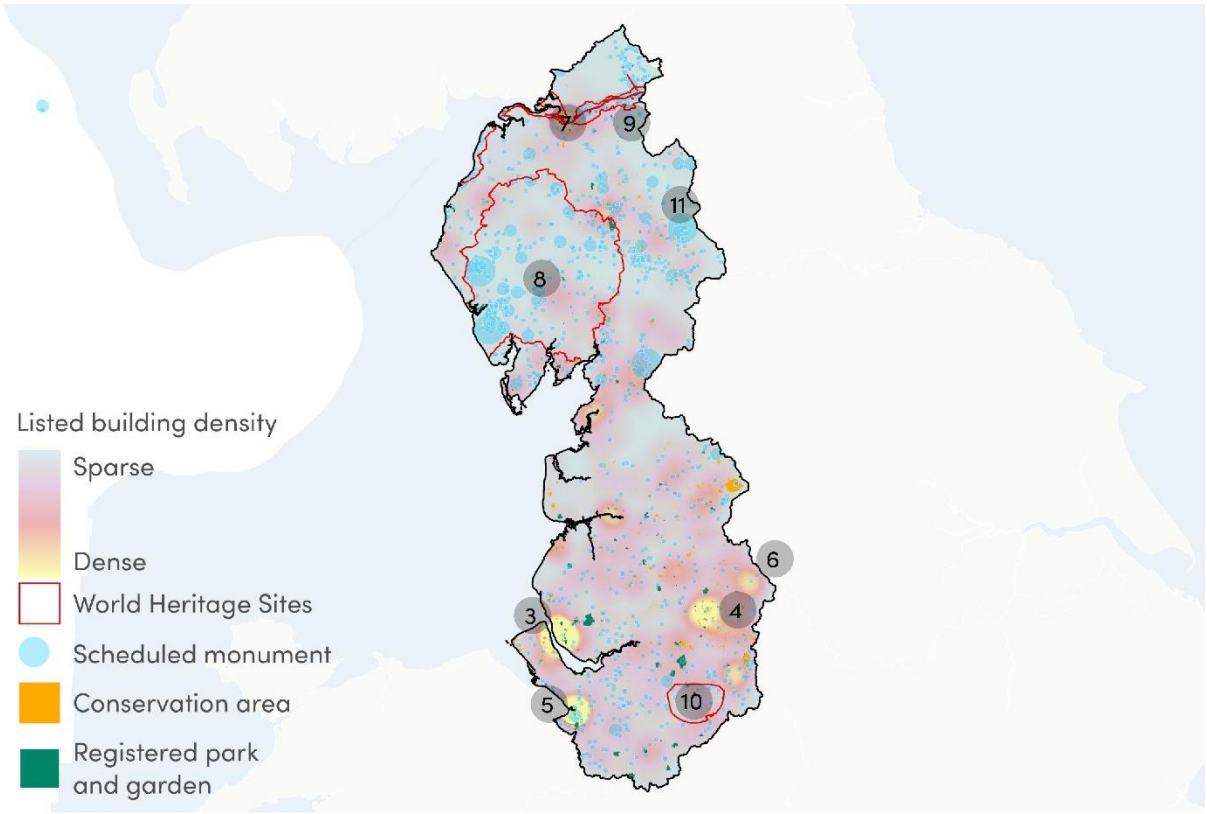


Figure 10.4: Designated heritage assets within Zone T6

Concentrations of historic environment designations in the zone (see Figure 10.4 above) include (but are not limited to):

- **Liverpool** (**3**), including associated with its rich maritime history as one of the world's major trading centres.
- **Manchester** (**4**), including its role as the first industrial city associated with the rapid growth of Manchester's cotton industry, which drove the town's expansion, putting it at the heart of new, global networks of manufacturing and trade.

- **Chester** (**5**), including associated with the Roman settlement, its development as a port, its central role in the defence against Welsh raiders and its later role as an affluent city set apart from industrial areas during the Georgian and Victorian periods.
- **Industrial centres of the south Pennines** (**6**), associated with the textile industry in areas such as Rochdale.
- **Carlisle** (**7**), including associated with its role as a Roman frontier town on Hadrian's Wall and a medieval frontier fortress between England and Scotland, and its later development as an industrial centre and railway town.
- The historic landscapes of the **Lake District** (**8**).

There are currently **three WHSs** in Zone T6:

- **Frontiers of the Roman Empire** (**9**): The zone contains the western part of Hadrian's Wall, which comprised part of the 'Roman Limes'. The Roman Limes represents the border line of the Roman Empire at its greatest extent in the 2nd century AD. It stretched over 5,000 km from the Atlantic coast of northern Britain, through Europe to the Black Sea, and from there to the Red Sea and across North Africa to the Atlantic coast. The remains of the Limes today consist of vestiges of built walls, ditches, forts, fortresses, watchtowers and civilian settlements. Certain elements of the line have been excavated, some reconstructed and a few destroyed. The 118-km-long Hadrian's Wall (UK) was built on the orders of the Emperor Hadrian c. AD 122 at the northernmost limits of the Roman province of Britannia. It is a striking example of the organization of a military zone and illustrates the defensive techniques and geopolitical strategies of ancient Rome.
- **The English Lake District** (**8**): The English Lake District is a mountainous area, whose valleys have been modelled by glaciers in the Ice Age and subsequently shaped by an agro-pastoral land-use system characterized by fields enclosed by walls. The combined work of nature and human activity has produced a harmonious landscape in which the mountains are mirrored in the lakes. Grand houses, gardens and parks have been purposely created to enhance the landscape's beauty. This landscape was greatly appreciated from the 18th century onwards by the Picturesque and later Romantic movements, which celebrated it in paintings, drawings and words. It also inspired an awareness of the importance of beautiful landscapes and triggered early efforts to preserve them.
- **Jodrell Bank Observatory** (**10**): Located in a rural area of northwest England, free from radio interference, Jodrell Bank is one of the world's leading radio astronomy observatories. At the beginning of its use, in 1945, the property housed research on cosmic rays detected by radar echoes. This observatory, which is still in operation, includes several radio telescopes and working buildings, including engineering sheds and the Control Building. Jodrell Bank has had substantial scientific impact in fields such as the study of meteors and the moon, the discovery of quasars, quantum optics, and the tracking of spacecraft. This exceptional technological ensemble illustrates the transition from traditional optical astronomy to radio astronomy (1940s to 1960s), which led to radical changes in the understanding of the universe.

In addition, the former **Liverpool – Maritime Mercantile City** was previously a WHS. However, in 2021, the World Heritage Committee decided to delete the property from the

World Heritage List, due to the irreversible loss of attributes conveying the outstanding universal value of the site.

The North West of England has a rich archaeological resource. Particular concentrations of **scheduled monuments** include in the following areas:

- **Hadrian's Wall** (**9**): The area has a significant Roman archaeological resource associated with its role as part of the Roman Lines (discussed above).
- **Pennines** (**11**): The area has a wealth of prehistoric and medieval remains. This ranges from Mesolithic campsites, earthworks of Neolithic and later settlements and field systems, and extensive remnants of the post-medieval 'miner-farmer' landscapes.
- **Lake District** (**8**): The area has significant number of features from the late Neolithic and early Bronze Age, including a large concentration of cairns and stone circles. There is also a wealth of Roman, Viking and medieval archaeology.

10.6. Ecology and biodiversity

Priority habitats are present across the region and represent a diverse range of habitats and support a wide variety of species. Particularly extensive areas of priority habitat, as shown on Figure 10.5 overleaf, include:

- Upland heathland and blanket bog in the Bowland Fells (**12**)
- Upland heathland, blanket bog, upland heathland, upland flushes, fens and swamps, mountain heaths and willow scrub, coastal and floodplain grazing marsh, deciduous woodland, and lakes in the Lake District National Park (**13**)
- Blanket bog, upland calcareous grassland, upland heathland, and mountain heaths and willow scrub in the North Pennine Moors (**14**)

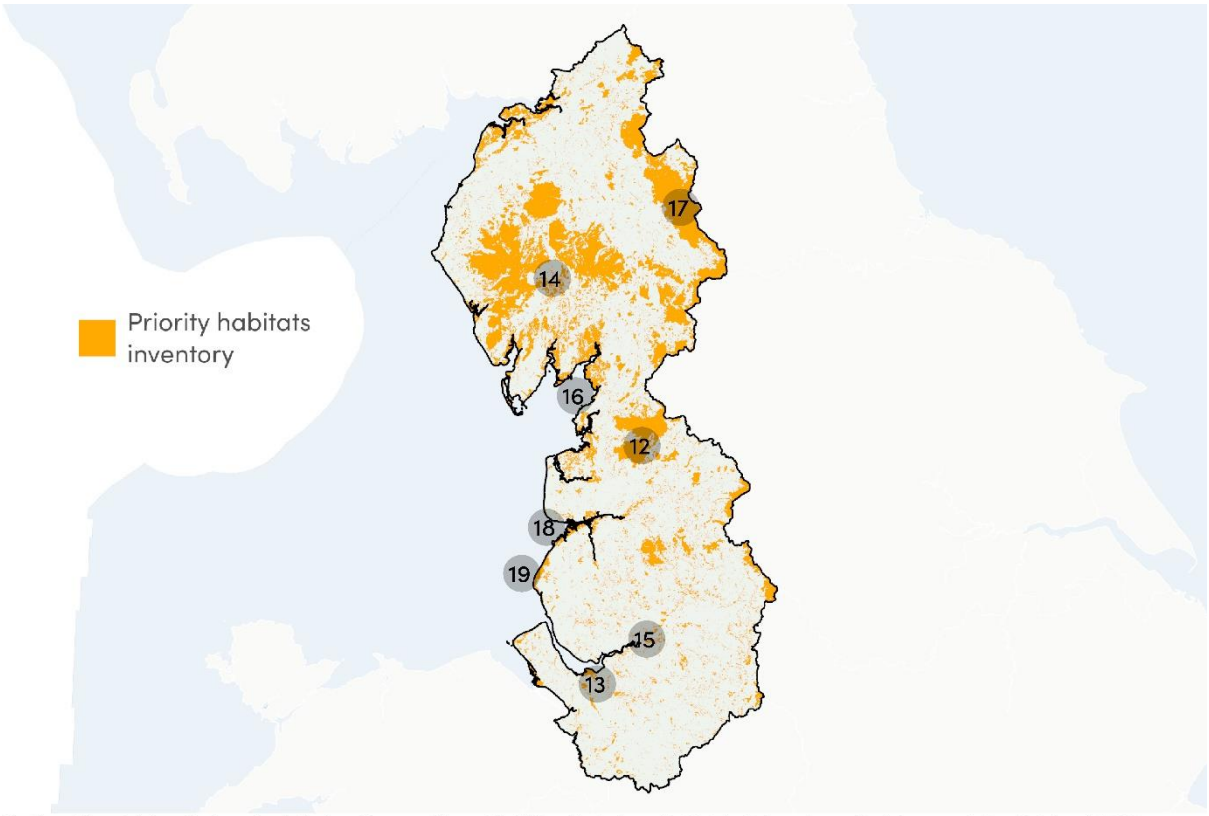


Figure 10.5: Cover of priority habitats in Zone T6

Overall, the area covered by **SAC** designations (including possible SACs) is 101,394 ha (7.2% of the zone); the area covered by **SPA** designations (including potential SPAs) is 70,651 ha (4.99% of the zone); and the area covered by **Ramsar site** designations (including proposed Ramsar sites) is 18,464 ha (1.3% of the zone). Internationally designated sites for biodiversity in Zone T6, as shown in Figure 10.6 overleaf, include:

- Lake District High Fells SAC (**15**)
- Moor House-Upper Teesdale SAC and North Pennine Moors SPA (**16**)
- Bowland Fells SPA (**17**)

The area covered by **SSSI** designations is 147,281 ha, which equates to 10.4% of the zone. Nationally designated sites for biodiversity in Zone T6, as shown in Figure 10.6 overleaf, include:

- Skiddaw Group, Buttermere Fells, and Armboth Fells SSSI (**15**)
- Moorhouse and Cross Fell SSSI (**16**)
- Bowland Fells SSSI (**17**)
- West Penine Moors SSSI (**18**)

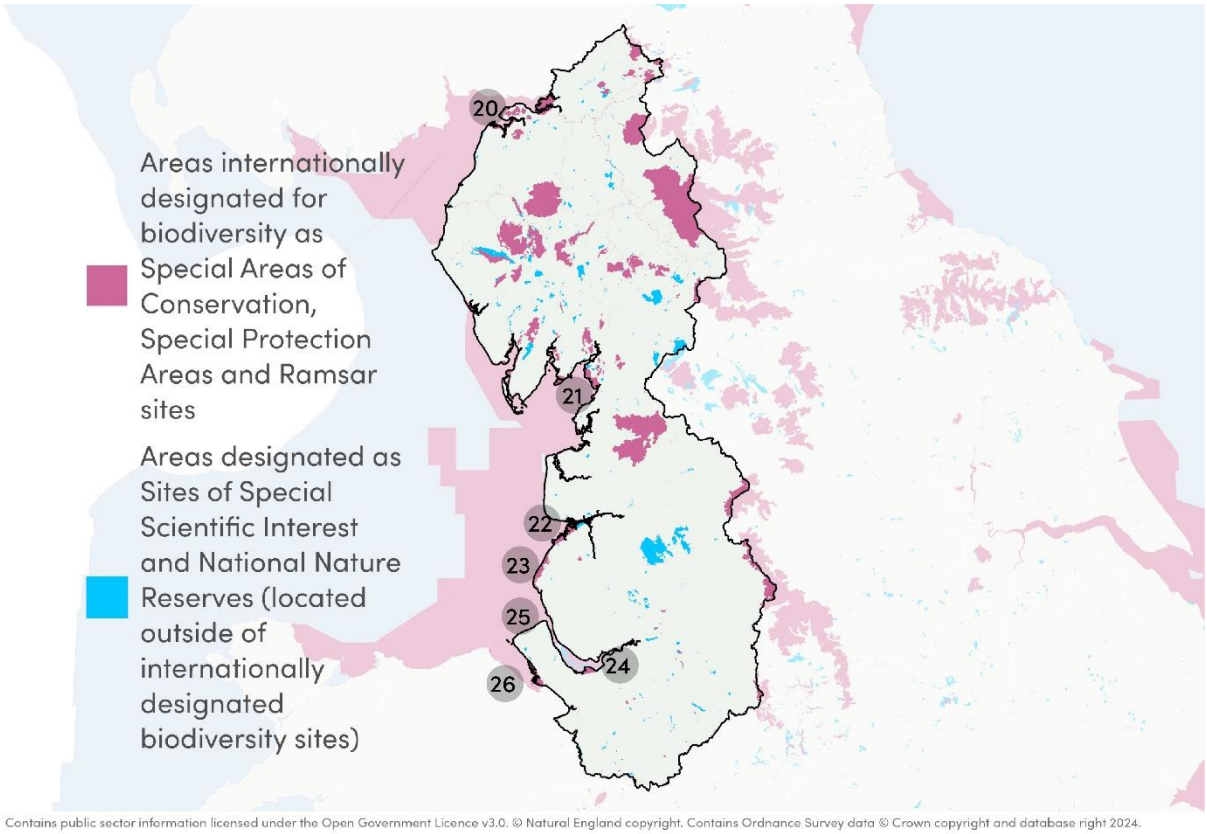


Figure 10.6: Internationally and nationally designated sites for biodiversity in Zone T6

The percentage of the zone covered by **ancient woodland** is 1.6%, totalling 22,143 ha.

10.7. Land and soil resources

With regard to ALC, as shown in Figure 10.7 overleaf, 13% of the zone is classified as **urban**, reflecting the significant urban areas in and around Manchester (**18**) and Liverpool (**19**), including their wider city regions. The zone has very little **grades 1 and 2** (excellent and very good) agricultural land, with the largest areas found around low-lying land along the River Mersey, and on land to the north and south (**20**) of the River Ribble, aligning with the Lancashire and Amounderness Plain character area. 54% of the zone is underlain by **grades 4 and 5** (poor and very poor) agricultural land. This is linked to the wide distribution of higher land, of which the geological characteristics, topography and natural processes reduce the agricultural potential and versatility of the land. This includes the Lake District (**21**), western areas of the North Pennines (**22**), the western edge of the Yorkshire Dales (**23**), the Forest of Bowland (**24**), the Southern Pennines (**25**) and the upland, western areas of the Peak District.

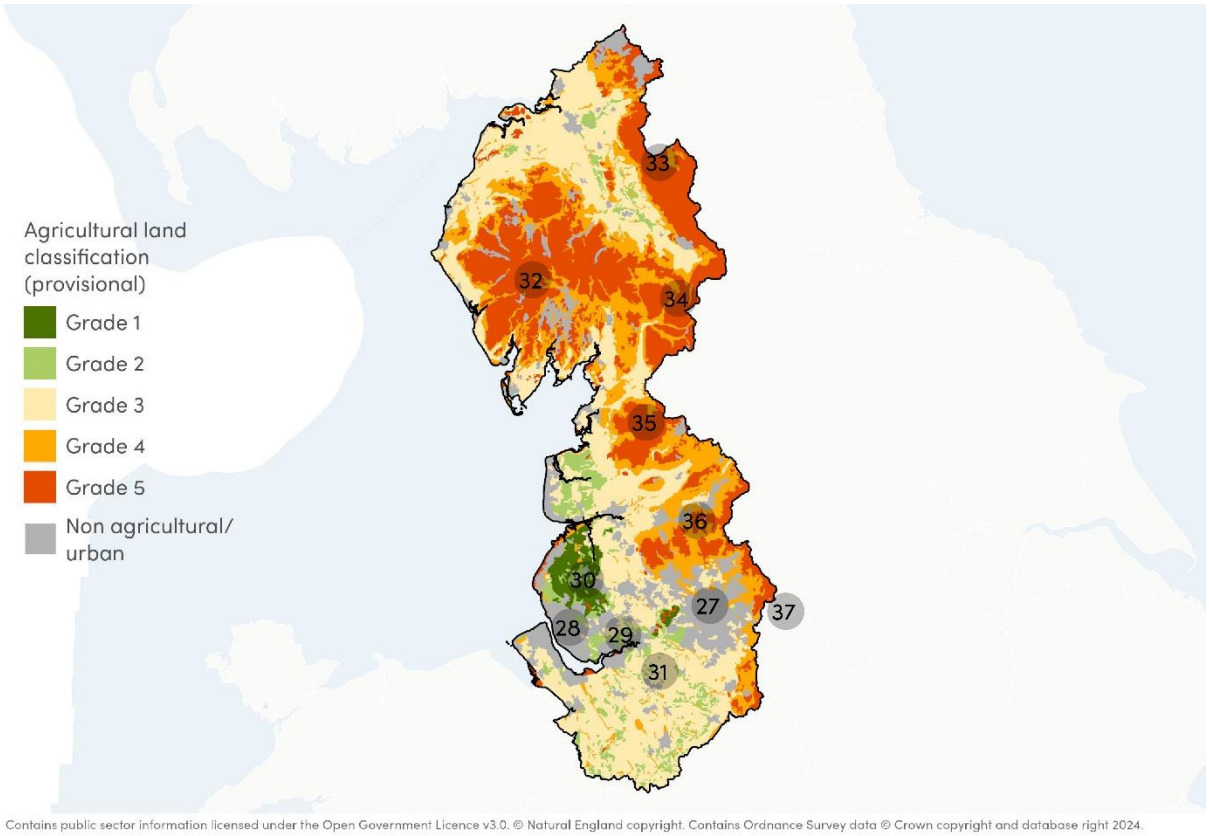


Figure 10.7: Agricultural land classification across Zone T6

10.8. Landscape and seascape

Zone T6 has a diverse range of landscapes, representing a significant breadth of landscape and seascape types which reflect the interplay of the area's topography, geology, biodiversity, land uses and cultural heritage.

To the north of Zone T6, the Lake District dominates the landscape, with **fells**, **glacial lakes**, and **picturesque valleys**, forming a rugged and scenic backdrop to the area.

To the west of the Zone, the coastline along the Irish Sea is characterised by **estuaries**, **sandy beaches**, and **historic ports** such as Whitehaven and Barrow-in-Furness. The region also has a rich **Roman and medieval history**, evidenced by sites like Hadrian's Wall in the north and castles scattered across Cumbria and Lancashire.

The Rivers Irwell, Mersey, and Ribble flow through urban and industrial areas, including Manchester, Liverpool, and Preston, which have been shaped by industries such as **shipping**, **textiles**, and **engineering**. This industrial heritage has left its mark on the landscape, with **canals**, **railways**, and **repurposed mills** visible across the region.

A significant proportion of Zone T6 (32.8%) is covered by National Park or National Landscape status: the percent of the zone covered by National Parks is 21.8% (309,347 ha); and the percent covered by National Landscapes is 11% (156,506 ha).

The **Lake District National Park** (see Figure 10.8 overleaf) is an upland National Park located in North West England. Its special qualities include lakes, tarns, and rivers; ancient

woodlands; a diverse range of habitats; tranquillity; an extensive network of public rights of way; traditional farming practices; and many historic buildings and structures.

The **Yorkshire Dales National Park** (see Figure 10.8 overleaf) is an upland National Park. Its special qualities include ancient dry-stone walls and field barns; waterfalls; limestone scenery; dark skies and tranquillity; an extensive network of public rights of way; traditional farming practices; and many historic buildings and structures.

Four National Landscapes (see Figure 10.8 overleaf) are located wholly or partly within Zone T6. These range from the upland landscapes of the **North Pennines**, with their open heather moors, upland dales, and notable areas such as High Force Waterfall, Alston, and Blanchland, to the coastal landscapes of the **Solway Coast**, featuring rugged cliffs, sandy beaches, and notable areas such as Silloth and Allonby. Additionally, the **Forest of Bowland** offers rolling hills and deep valleys, while **Arnside and Silverdale** feature limestone pavements, ancient woodlands, and notable areas such as Arnside Knott and Leighton Moss.

Heritage coasts have been established to conserve the best stretches of undeveloped coast in England. Reflecting the area's distinctive seascapes, a small proportion of Zone T6 (0.004%) is covered by heritage coast.

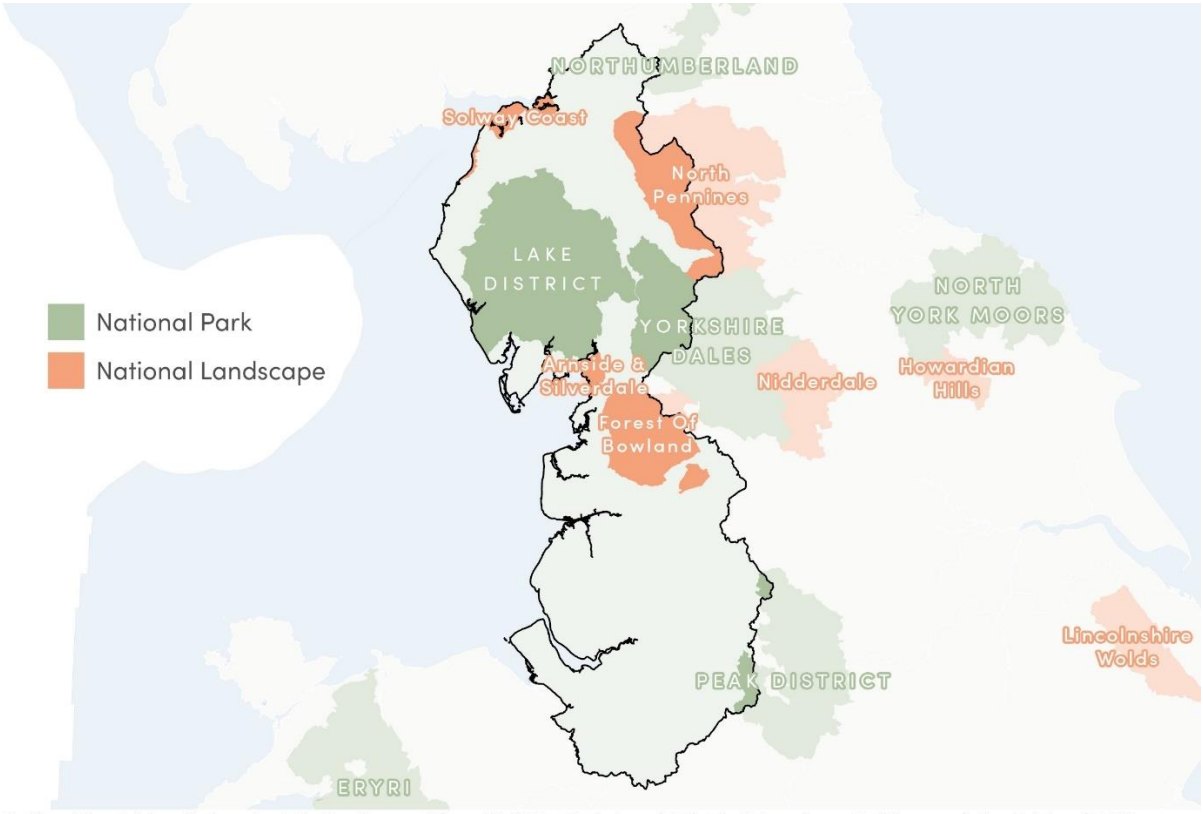


Figure 10.8: Designated landscapes within Zone T6

10.9. Water

According to the WFD river classification data (2019), **22 waterbodies** in Zone T6 are classified as having a **'bad' ecological status**. These are:

- Audlem Brook
- Birkin Brook – Mobberley Brook to River Bollin (including Rosther)
- Chalk Beck
- Croco
- Crummock Beck u/s Holme Dub
- Dacre Beck us Skitwath Beck
- Dry Beck (Hall Burn)
- Gaitle / Beck Burn
- Glaze
- Glenzier Burn
- Leighton Beck
- Lords Brook
- Peover Eye
- Pow Beck (Eden and Esk)
- Pow Maughan Beck
- Rae Burn
- Roe Beck (Lower)
- Skirden Beck
- Smoker Brook (Gale Brook to Wincham Brook)
- Wampool (Upper)
- Wheelock (Fowle Brook to Dane)
- Wistaston Brook

The River Basin District Flood Risk Management Plans that cover Zone T6, and the **FRAs** which falls within the zone, are set out below:

- The **North West** River Basin District Flood Risk Management Plan 2021 to 2027[95] highlights **seven FRAs** for significant risk of flooding from **main rivers and the sea**: Ambleside, Atherton, Ellesmere Port, Higher Folds, Kendal, Preston, and Warrington. It also identifies **eight FRAs** as being at significant risk of flooding from **surface water**: Ashton-under Lyne, Blackburn, Burnley, Formby, Liverpool, Macclesfield, Rawtenstall, and Southport.
- There are no FRAs within the **Dee River** Basin District according to the Flood Risk Management Plan 2021 to 2027[96]. Similarly, there are no FRAs within the Solway Tweed River Basin District according to the Flood Risk Management Plan 2021 to 2027.[97]

As highlighted in the North West River Basin District River Basin Management Plan , particular **challenges facing the water environment** include: climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

[95] UK Government (2016): North West River Basin District Flood Risk Management Plan
[96] UK Government (2016): Dee River Basin District Flood Risk Management Plan
[97] Uk Government (2016): Solway Tweed River Basin District Flood Risk Management Plan

Areas of **Flood Zone 2** in Zone T6 are shown in Figure 10.9 below.

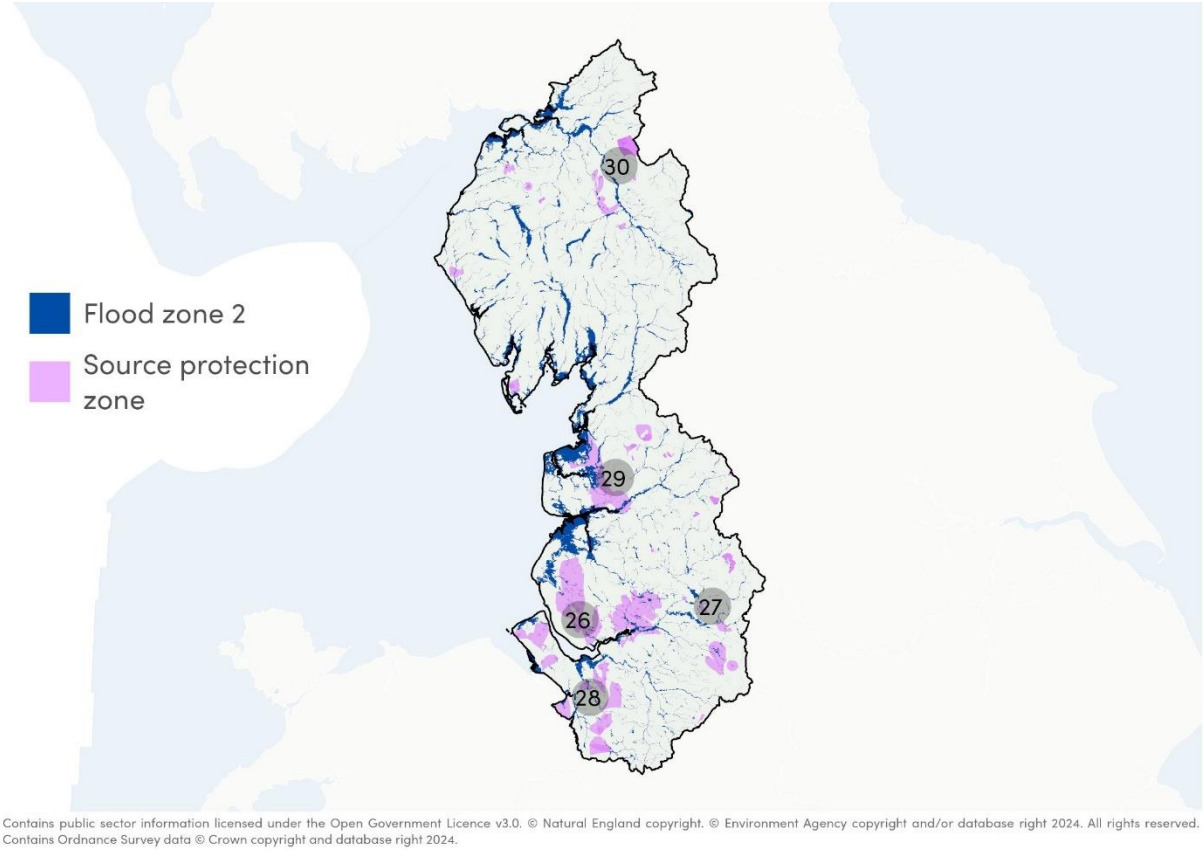


Figure 10.9: Areas of Flood Zone 2 and SPZs and NVZs within Zone T6

SPZs (see Figure 10.9 above) are mostly present in the vicinity of Liverpool (**26**), Manchester (**27**), Chester (**28**), Preston and Lancaster (**29**), and Penrith (**30**).

10.10.Key issues for Zone T6

The following key issues have been identified through the review of the baseline information for Zone T6:

- The North West has significant stores of **carbon**, including woodland (located across the region) and peatland (largely concentrated within the Lake District National Park, the Yorkshire Dales National Park, and the multiple National Landscapes).
- The North West includes some of the **most deprived** communities in England, including in parts of Greater Manchester, Liverpool, Birkenhead, Warrington, St Helens Preston and Burnley. The zone also includes coastal towns and areas with high levels of deprivation, including Blackpool and Morecambe
- Deprivation linked to **accessibility** to services, facilities and opportunities is also a significant issue for some rural parts of Cumbria and the Pennines.
- Rural areas, especially to the north of the region have a strong **agricultural heritage**.
- **Recreation** is important to the zone, with the National Parks in the zone being popular destinations for tourism.

- The area has a rich **historic environment**. The are particular concentrations of industrial heritage associated with the industrial revolution and a strong maritime heritage in Liverpool.
- The area has a rich **archaeological heritage**, including in the Pennines, Lake District and the area around Hadrian's Wall.
- There are three **WHSs** in the zone, the English Lake District, Hadrian's Wall and the Jodrell Bank Observatory. Liverpool however lost its World Heritage status in 2021.
- Zone T6 has a diverse range of landscapes, including the **Lake District National Park** and the **Yorkshire Dales National Park**, and four **National Landscapes** including the North Pennines, the Solway Coast, the Forest of Bowland and Arnside and Silverdale.
- A significant proportion of the North West region's coastline is internationally and nationally designated for its **biodiversity** value, including on the Solway Firth, Morecambe Bay, Ribble & Alt Estuaries, Sefton Coast the Mersey Estuary and the Dee Estuary.
- **22 waterbodies** in Zone T6 are classified as having a **'bad' ecological status**.
- Particular **challenges facing the water environment** include climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

11. Zone T7: Yorkshire and the Humber, England

Overview of Zone T7

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for T7

11.1. Overview of Zone T7

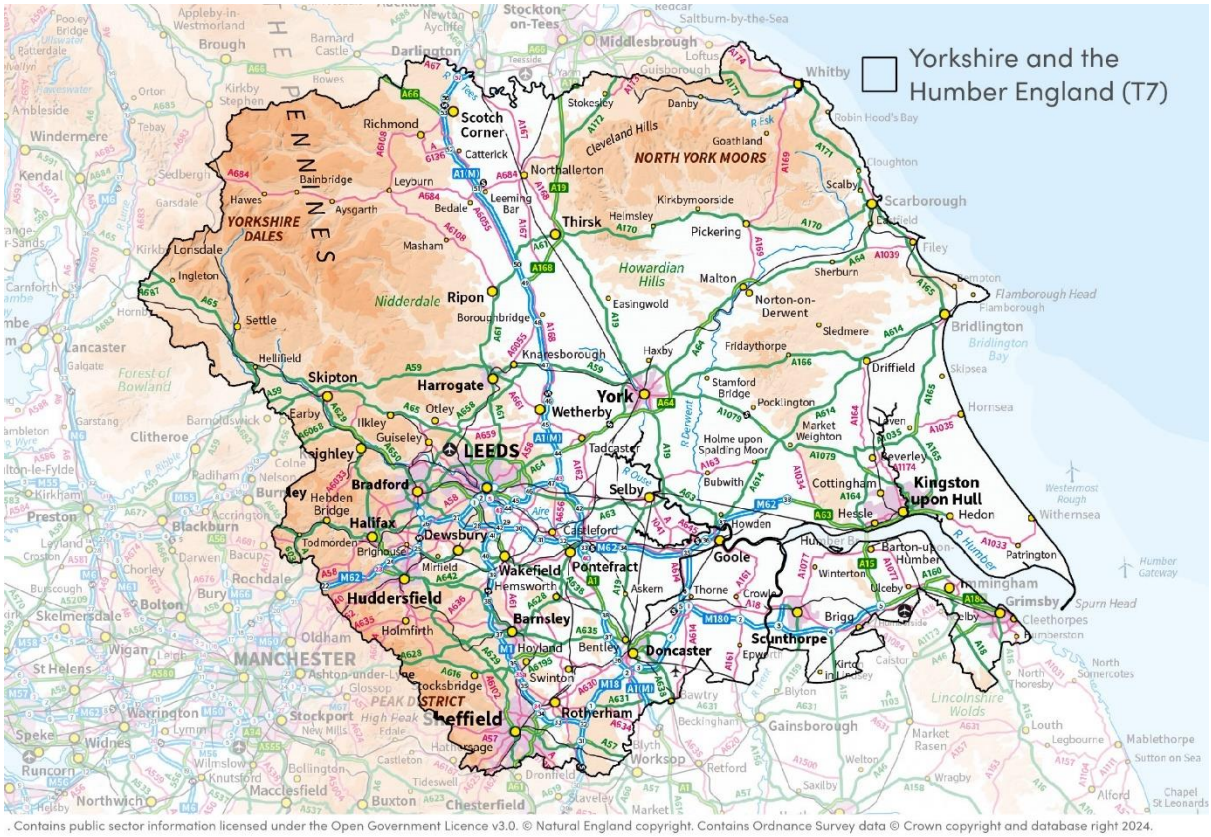


Figure 11.1: Area covered by Zone T7 – Yorkshire and the Humber, England

Zone T7 comprises the Yorkshire and the Humber region of England.

The Yorkshire and Humber zone (see Figure 11.1 above) is a region which spans **15,407 km²**. It has a population of **5.5 million** and includes a mix of urban areas (including Leeds, Sheffield, Hull, Bradford and York) as well as more rural areas which offer some high value natural capital assets.

The north east and west of the zone have some high value landscapes and the area includes three National Parks and three National Landscapes which cover mountains, dales and moors across elevated areas of land. Many of these areas are internationally designated for their habitats and species.

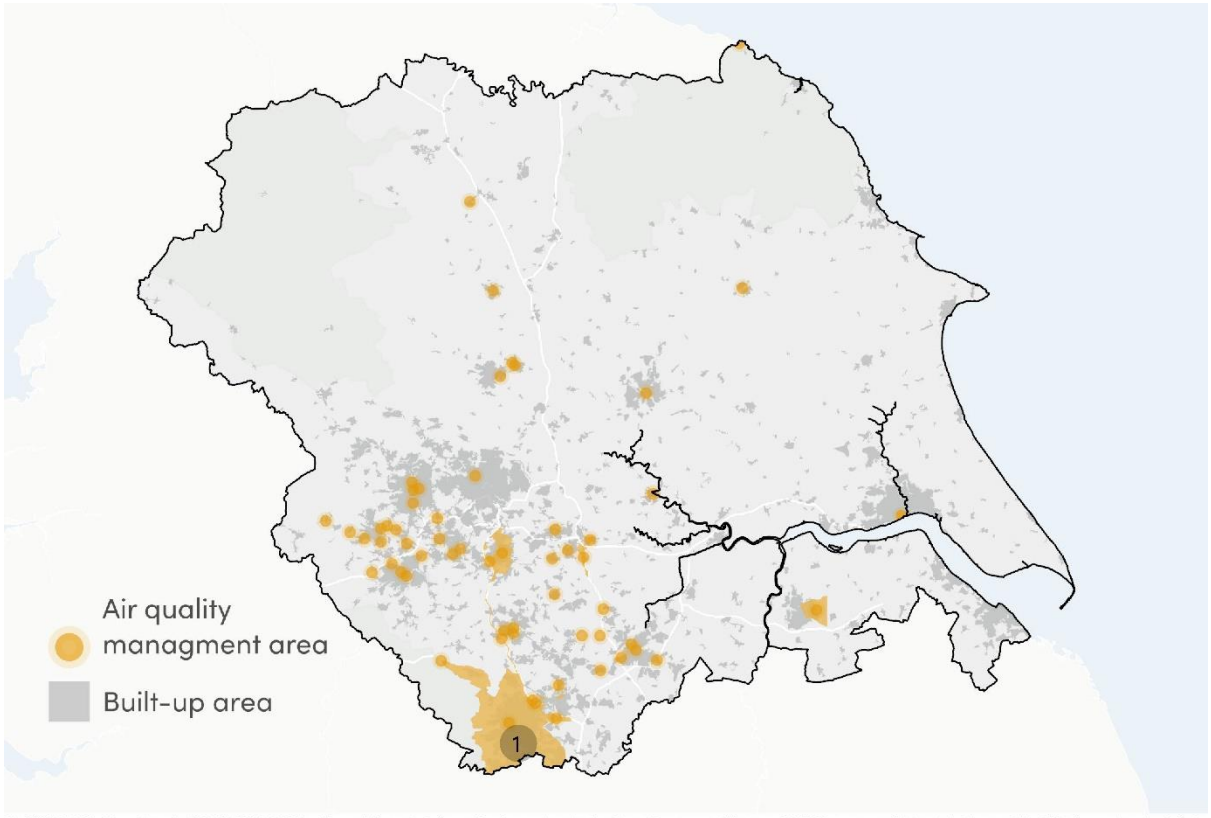
Low lying land extends across the south and south east of the zone, drained by major rivers such as the Ouse, Aire, Don, Calder and Trent. Many of the settlements in these catchments are prone to flooding.

Historical coal mining and steel production in the zone have seen decline and sectors such as digital technologies, financial and professional services and advanced manufacturing have seen growth. The historical significance of the city of York dates back to the Roman Era; the city's abundance of historic buildings and townscapes mean that it is a significant tourist hub for domestic and international visitors. The area otherwise has a rich and diverse historic environment.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

11.2. Air quality

Air quality issues in the zone are largely associated with road traffic and transport. As highlighted by the location of the **59 AQMAs**, areas of air quality concern are largely concentrated in the south / south-east of the zone, with a significant number of AQMAs within and surrounding the urban centres of Leeds and Sheffield (see Figure 11.2 below). These are primarily designated for exceedances in the annual mean concentration objective of 40µg/m^3 for NO_2, though a large AQMA within Sheffield (**1**) is designated for both exceedances in the annual mean concentration objective and the one hour mean concentration objective 200µg/m^3 for this pollutant. This AQMA is also designated for exceedances in the 24 mean concentration objective for PM_{10}, which is 50µg/m^3 – linked to dust pollution.[98]



[98] Sheffield City Council (2023): 2023 Air Quality Annual Status Report (ASR)

Figure 11.2: AQMAs in Zone T7

11.3. Climate change

In Yorkshire and the Humber, total GHG emissions amounted to **35,501.2 kt CO_2e** in 2022. Of this, the **transport sector** is responsible for approx. 27.6% of emissions; the industrial sector is responsible for approx. 27.4%, and the domestic sector for approx. 19.6%[99].

Carbon storage in this zone is largely concentrated within peatland in the Yorkshire Dales National Park, the Peak District National Park, the North York Moors National Park, and the two National Landscapes. The importance of peatland is recognised within this zone; the Yorkshire Peat Partnership is restoring peatlands in the Yorkshire Dales and North York Moors National Parks and the Nidderdale National Landscape – delivering restoration work across 42,868 hectares at the end of March 2023 (approx. 45% of the total peatland across these landscapes). It is noted that the Yorkshire and Humber region is also the focus of carbon capture and storage technologies, with the proposed Humber Carbon Capture Pipeline project at the pre-application phase. This project will capture carbon and store it offshore in the North Sea[100].

Primary impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections (UKCP18)[101], winters in this zone are anticipated to be 1.26°C warmer between 2021-2040 and 2.97°C warmer between 2061-2080 in comparison to 1981-2000 (3.12°C). Warmer summers are also anticipated - with a 2.05°C increase anticipated for 2021-2040, and a 4.72°C increase for 2061-2080 in comparison to 1981-2000 (14.16°C). Winters in this zone are anticipated to be wetter (increasing to 3.93mm/day in 2061-2080 in comparison to 3.4mm/day in 1981-2000), and drier in the summer (decreasing to 1.7mm/day in 2061-2080 in comparison to 2.32mm/day in 1981-2000)[102]. The zone is at significant risk of flooding, which is likely to increase with the effects of climate; this is discussed below.

Secondary impacts from climate change are largely linked to changes in temperature, humidity and precipitation. These can be widespread and impact upon ecosystems, people, settlements and infrastructure. Changes in precipitation patterns can lead to an increase in flood events or the occurrence of drought, which can impact on agriculture and natural resources. Increased temperatures can also result in heat-related human mortality, and cause species loss. Additionally, higher temperatures and the occurrence of heatwaves can aggravate air pollution events and also limit the function of key infrastructure – including compromising energy systems. The Intergovernmental Panel on Climate Change (IPCC) outlines that the energy sector is climate-exposed, indicating that energy infrastructure will become increasingly vulnerable if design standards do not

[99] UK Government (2022): UK local authority and regional greenhouse gas emissions statistics
[100] Planning Inspectorate (no date): Humber Carbon Capture Pipeline – Project information
[101] Met Office (no date): UKCP data
[102] Based on the RCP8.5 emissions scenario, which assumes there is fast population growth, low technical development rate, slow GDP growth, a massive increase in world poverty and high energy use and emissions. It also assumes no climate change mitigation or adaptation techniques are engaged with.

account for changing climate conditions[103]. Infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems are viewed as the most feasible adaptation techniques – alongside energy generation diversification (i.e., a greater use of renewable energy)[104].

11.4. Community wellbeing

The population of the Yorkshire and the Humber region is **5,480,774** (ONS Census 2021). It has a population density of 355.8 residents per km^2, with higher densities across the major cities and former industrial towns. The region also includes some districts with overall low densities including Richmondshire and Ryedale.

The age profile in the Yorkshire and the Humber region is similar to the English average (see Figure 11.3 below). Most of the population (62.3%) falls within the **working age** bands, with 18.5% of the population aged 15 and under and 19% aged over 65 (Census 2021).

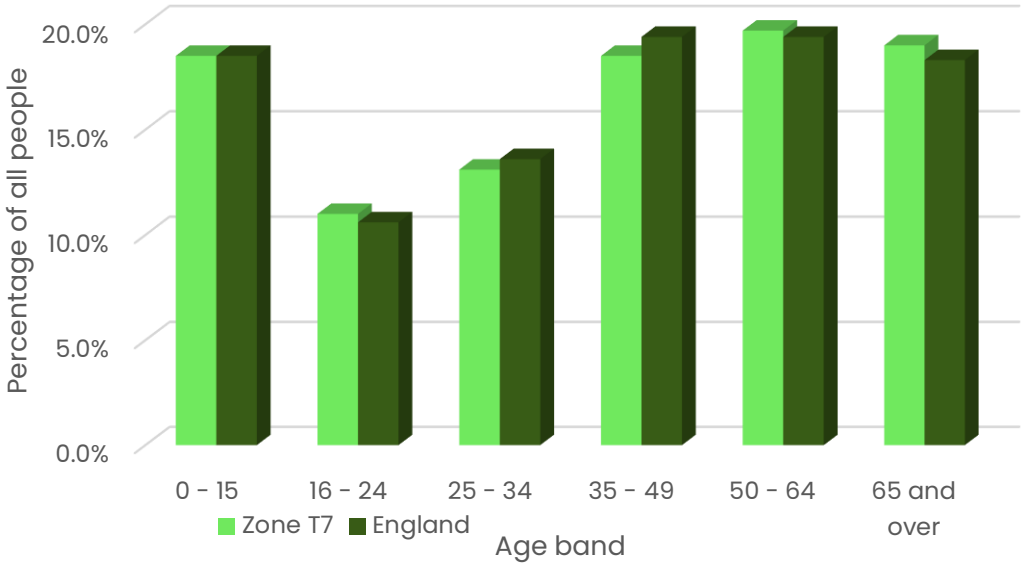


Figure 11.3: Age profile of Zone T7 (source ONS Census 2021)

IMD data from 2019 shows that the Yorkshire and the Humber region includes significant areas with **high levels of deprivation**, largely located in the former industrial and mining cities and towns. These areas include some of the most deprived communities in England and are mostly located in the southern part of the zone including parts of South Yorkshire, West Yorkshire, Hull and North Lincolnshire. The zone also includes coastal towns and areas with high levels of deprivation, including Grimsby, Cleethorpes and Scarborough. Areas of lower deprivation include in and around York, Harrogate, north of Leeds and south west of Sheffield. Most villages and small towns in North Yorkshire in the northern part of the zone have lower levels of deprivation, compared to the rest of zone where deprivation levels vary.

[103] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[104] IPCC (2019): Climate Change and Land

Key 'traditional' economic sectors in the zone include steel production, textile manufacturing and coal mining. There is also a strong agricultural tradition in the rural areas of the zone, particularly in the North Yorkshire area. Current economic sectors also include a growing advanced manufacturing, legal and professional services, digital and creative industries and retail and hospitality sectors.

In Zone T7, the industries with the **highest regional GVA in 2022**[105] were the services sector and production sector.

The region has a comprehensive **rights of way network**, which provides access and opportunities for leisure and nature-based recreation between settlements and provides access to the countryside and national parks. Paths and bridleways in and around the national parks and the coast are also popular for tourism. The Zone also includes four National Trails including the Pennine Way and Pennine Bridleway in the west, the 131km Yorkshire Wolds Way and the 171km Cleveland Way which partially runs along the North Yorkshire and Cleveland heritage coast.

11.5. Cultural heritage and historic environment

Zone T7 has a rich and diverse **historic environment** and cultural heritage resource. The distribution and diversity of heritage features in Yorkshire and the Humber reflect the historic evolution of the region from prehistoric times, incorporating:

- Neolithic and early Bronze Age settlement.
- Occupation and settlement by the Romans, Angles and Vikings.
- Norman settlement and agricultural development; the War of the Roses.
- Uprisings during the Tudor and Stuart periods.
- Rapid industrialisation and urbanisation as a centre for the industrial revolution.

[105] ONS (2024): Regional gross value added (balanced) by industry: all ITL regions

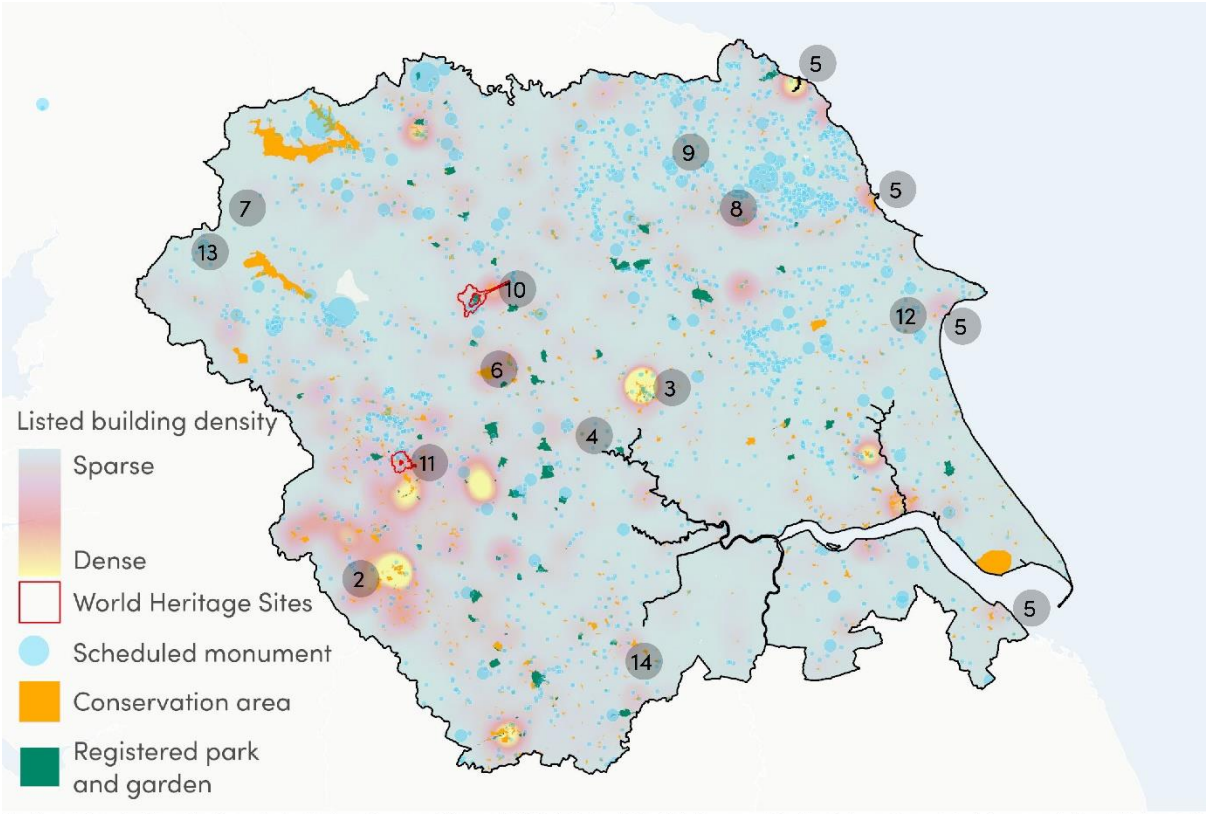


Figure 11.4: Designated heritage assets within Zone T7

Key concentrations of historic environment designations in the zone (see Figure 11.4 above) include:

- The vicinities of **Leeds**, **Bradford**, **Halifax**, **Huddersfield** and **Sheffield** (**2**), which contain particular concentrations of industrial heritage.
- The city of **York** (**3**) contains a rich diversity of heritage resources, reflecting its role as a key Roman, Viking, Northumbrian and medieval centre; the city contains a wealth of Roman and Viking remains, as well as medieval buildings and Georgian architecture.
- The great monastic and agricultural estates of Yorkshire, including Castle Howard, Fountains Abbey, Harewood House, Sewerby Hall and Whitby Abbey. Particular densities of registered parks and gardens are located in a belt between Sheffield, **Wetherby** (**4**) and Richmond on the eastern edges of the Pennines, many of which were constructed off the profits of the industrial revolution.
- The coastal settlements of **Whitby**, **Scarborough** and **Cleethorpes** (**5**), reflecting a rich maritime and seaside heritage.
- The Georgian spa towns of **Harrogate / Knaresborough** and **Ripon** (**6**).
- The historic rural landscapes of the **Yorkshire Dales** (**7**) and **Vale of Pickering** (**8**).
- The rich archaeological landscapes of the **North York Moors** (**9**).

There are **two WHSs** in Zone T7, as follows:

- **Studley Royal Park including the Ruins of Fountains Abbey** (**10**): Situated in North Yorkshire, this comprises the 18th century designed landscape of Studley Royal water garden and pleasure grounds, including the ruins of Fountains Abbey. Studley Royal

Park is one of the few great 18th century gardens to survive substantially in its original form and is one of the most spectacular water gardens in England. The landscape garden is an outstanding example of the development of the 'English' garden style throughout the 18th century, which influenced the rest of Europe. Fountains Abbey is an integral part of the gardens, but is important in its own right, being one of the few Cistercian houses to survive from the 12th century and providing an unrivalled picture of a great religious house.

- **Saltaire** (**11**): Saltaire in West Yorkshire is an exceptionally complete and well-preserved industrial village of the second half of the 19th century, located on the river Aire. Its textile mills, public buildings, and workers' housing are built in a harmonious style of high architectural quality and the urban plan survives intact, giving a vivid impression of the philanthropic approach to industrial management.

The zone has a rich **archaeological resource**. Particular concentrations of scheduled monuments include:

- **North York Moors** (**9**): Archaeological remains date from the last Ice Age through to the Cold War period. The North York Moors is home to the largest Iron Age hillfort of its kind in the North of England as well as Roman Forts, castles, abbeys and important early industrial sites.
- **Yorkshire Wolds** (**12**): Sites and monuments include examples of Neolithic, Bronze and Iron Age burials, ritual complexes and prehistoric dyke systems. The area is particularly rich in deserted medieval villages.
- **Yorkshire Dales** (**13**): The area has a wealth of Neolithic and Bronze Age burial mounds, Iron Age enclosures and Roman military camps.
- **Ouse and Aire and Don valleys** (**14**): Reflecting historic transport routes between the coast and the Gritstone uplands.

11.6. Ecology and biodiversity

Priority habitats are present across the region and represent a diverse range of habitats and support a wide variety of species. Particularly extensive areas of priority habitat are shown in Figure 11.5 overleaf, and include:

- Limestone pavement in the Craven Limestone Complex (**15**)
- Blanket bog and upland heathland in the North Pennine Moors (**16**) and the South Pennine Moors (**17**)
- Upland heathland in the North York Moors (**18**)

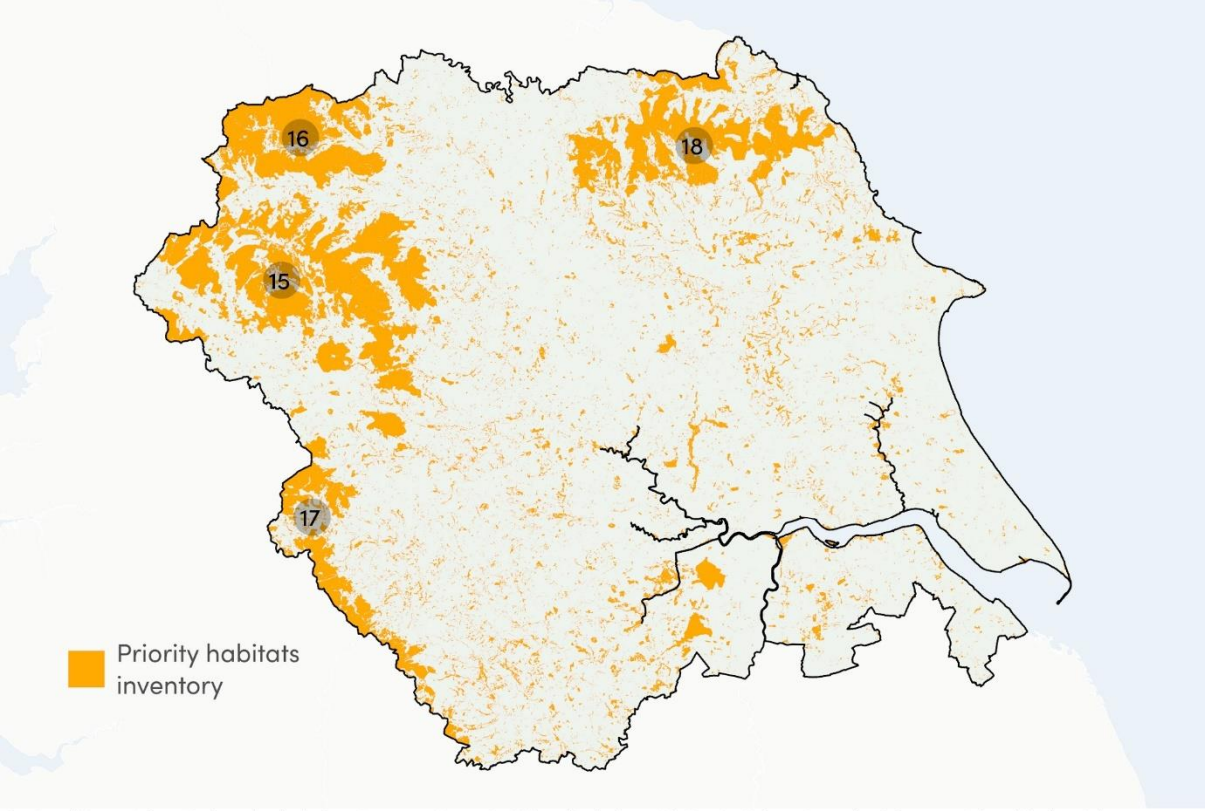


Figure 11.5: Cover of priority habitats in Zone T7

Overall, the area covered by **SAC** designations (including possible SACs) is 138,620 ha (9% of the zone); the area covered by **SPA** designations (including potential SPAs) is 125,718 ha (8.16% of the zone); and the area covered by **Ramsar site** designations (including proposed Ramsar sites) is 2,922 ha (0.2% of the zone). Internationally designated sites for biodiversity in Zone T7, as shown in Figure 11.6 overleaf include:

- Craven Limestone Complex SAC (**19**)
- North Pennine Moors SAC and SPA (**20**)
- South Pennine Moors SAC and SPA (**21**)
- North York Moors SAC and SPA (**22**)

The area covered by **SSSI** designations is 157,454 ha (10.2% of the zone). Nationally designated sites for biodiversity in Zone T7, as shown in Figure 11.6 overleaf include:

- Malham-Arncliffe SSSI (**19**)
- Arkengarthdale, Gunnerside and Reeth Moors; Mallerstang-Swaledale Head; and Lovely Seat – Stainton Moor SSSI (**20**)
- South Pennine Moors SSSI (**21**)
- North York Moors SSSI (**22**)
- Pen-Y-Ghent SSSI (**23**)

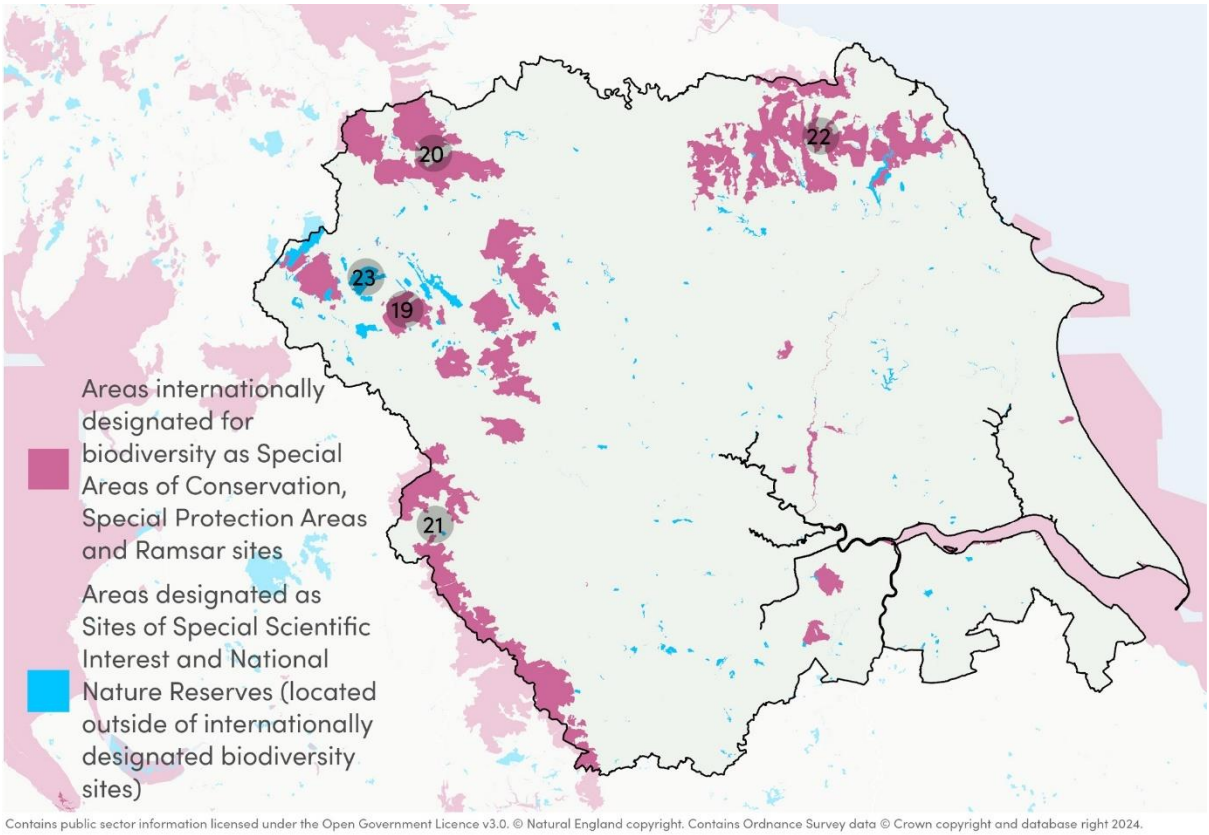


Figure 11.6: Internationally and nationally designated sites for biodiversity in Zone T7

The percentage of the zone covered by **ancient woodland** is 1.5%, totalling 23,596 ha.

11.7. Land and soil resources

With regard to ALC, as shown in Figure 11.7 overleaf, Zone T7 has extensive areas covered by **best and most versatile (BMV)** agricultural land. The areas surrounding the River Ouse and River Trent in the south of the zone (**24**) offer the largest concentrations of **grade 1** (excellent) agricultural land in this zone. The low-lying land running in a band north to south from south of Darlington (**25**), through the Vale of York (**26**) and down towards Doncaster (**27**) is covered by **grade 2** land. Further areas of grade 2 land are present in East Riding and north and north east Lincolnshire.

Lower-quality agricultural land is present in the elevated Cleveland Hills (**28**), Yorkshire Dales (**29**) and Peak District (**30**), resulting in 40% of the zone being **grades 4 and 5** (poor to very poor) agricultural land.

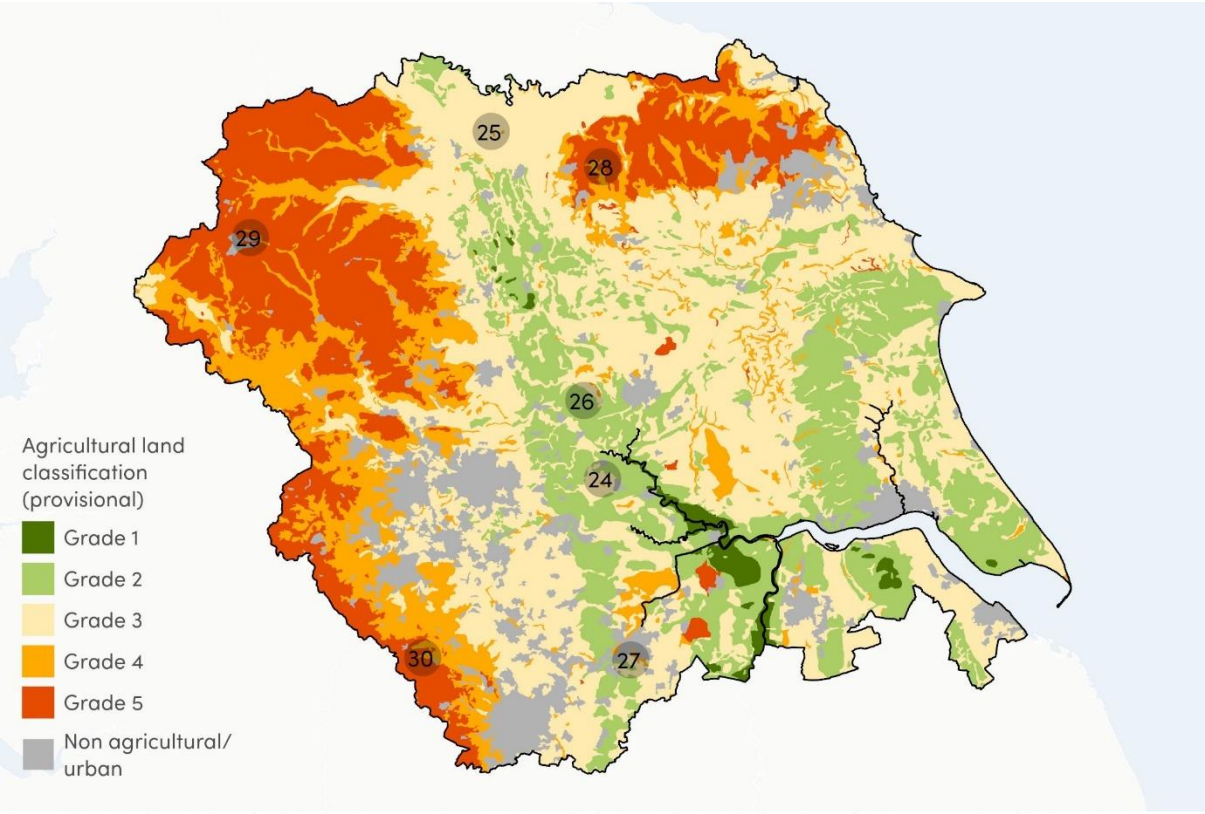


Figure 11.7: Agricultural land classification across Zone T7

11.8. Landscape and seascape

Zone T7 has a diverse range of landscapes, representing a significant breadth of landscape and seascape types which reflect the interplay of the area's topography, geology, biodiversity, land uses and cultural heritage.

To the north of Zone T7, including in the North York Moors, the landscape is characterised by **upland formations** such as limestone hills, deep valleys, and heather-clad moorland.

The eastern coastline is marked by **cliffs**, **beaches**, and **fishing ports** such as Whitby and Scarborough. The Humber Estuary is located on the zone's southern coast, where a blend of urban and natural landscapes can be found, highlighted by notable landmarks such as the **Humber Bridge** and **Spurn Point**. The estuary is fed by the **River Ouse**, which flows through York, a city with significant Roman and Viking heritage.

The zone's rural landscape is dominated by **agricultural land**, with arable farming and livestock grazing prevalent across the fertile plains in the zone's central and southern areas.

Industrial development in Zone T7 has been concentrated in Hull, Sheffield and Leeds, where **shipbuilding**, **steel production**, and **textiles**, respectively, have historically shaped their landscape / seascape.

A significant proportion of Zone T7 (26.4%) is covered by National Park or National Landscape status: the percent of the zone covered by National Parks is 20.4% (314,659 ha); and the percent covered by National Landscapes is 6% (92,275 ha).

The majority of the **Yorkshire Dales National Park** is located in Zone T7 (see Figure 11.8 overleaf). Its special qualities include ancient dry-stone walls and field barns; waterfalls; limestone scenery; dark skies and tranquillity; an extensive network of public rights of way; traditional farming practices; and many historic buildings and structures.

The majority of the **North York Moors National Park** is also located in Zone T7 (see Figure 11.8 overleaf). Its special qualities include heather moorland; a coastline with dramatic cliffs and secluded bays; ancient woodlands; villages; dark skies and tranquillity; an extensive network of public rights of way; traditional farming practices; clean water; significant historical sites; and many historic buildings and structures.

A small proportion of **Peak District National Park** is located in Zone T7 (see Figure 11.8 overleaf). Its special qualities include dramatic rock edges and wild moorlands; dales; ancient woodlands; limestone caves; tranquillity; an extensive network of public rights of way; traditional farming practices; clean water; many historic buildings and structures.

Five National Landscapes are located wholly or partly within Zone T7 (see Figure 11.8 overleaf). These range from the upland landscapes of the **North Pennines**, with their open heather moors, dramatic upland dales, and notable areas such as High Force Waterfall, Alston, and Blanchland, to the rolling hills and deep valleys of **Nidderdale**, featuring picturesque spots such as Pateley Bridge and Brimham Rocks. Additionally, the **Forest of Bowland** offers rolling hills, deep valleys, and notable areas such as Clitheroe and Slaidburn, while the **Howardian Hills** feature wooded slopes, parklands, and notable areas such as Castle Howard and Terrington. A small part of the **Lincolnshire Wolds**, with their gentle hills and valleys, extends into the south of the zone. Proposals to designate the **Yorkshire Wolds** as a National Landscape are also at an advanced stage, and consultation of the proposals ended in January 2025.

Heritage coasts have been established to conserve the best stretches of undeveloped coast in England. A small proportion of Zone T7 (0.06%) is covered by heritage coast.

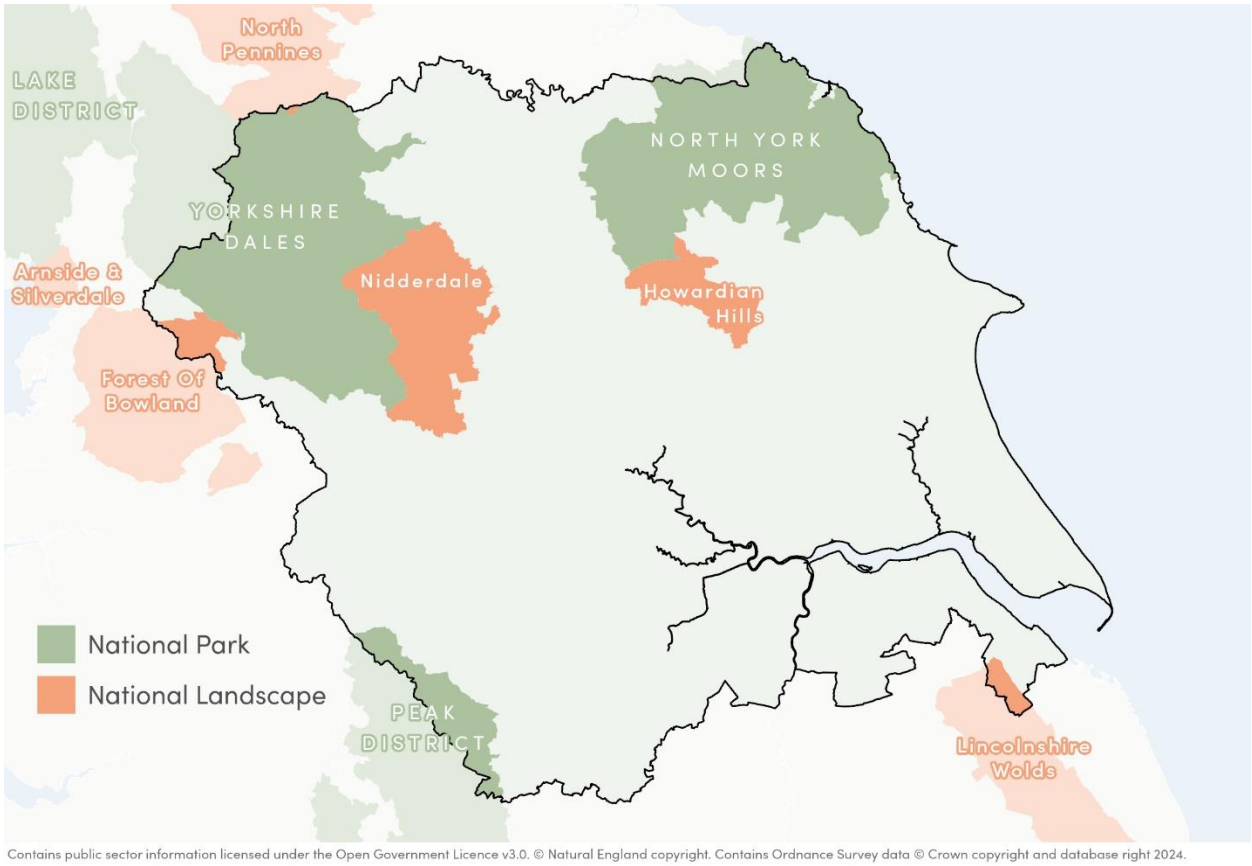


Figure 11.8: Designated landscapes within Zone T7

11.9. Water

According to the WFD river classification data (2019), **13 waterbodies** in Zone T7 are classified as having a **'bad' ecological status**. These are:

- Ashfoldside Beck to River Nidd
- Birk Lane Drain Catch (trib of Derwent)
- Cock Beck Catchment (trib of Wharfe)
- Foss from Source to Farlington Beck
- Gypsey Race from Source to North Sea
- Hertford from Source to River Derwent
- Laceby Beck / River Freshney Catchment (to N Sea)
- Ruston Beck catchment (trib of Derwent)
- Skitter Beck / East Halton Beck
- Spa Beck Catchment (trib of Tees)
- The Foss
- The Foss Catchment (trib of Wharfe)
- Thorner Beck Catchment (trib of Wharfe)

The River Basin District Flood Risk Management Plans that cover Zone T7, and the **FRAs** which falls within the zone, are set out below:

- The **Humber** River Basin District Flood Risk Management Plan 2021 to 2027[106] highlights 38 FRAs for significant risk of flooding from **main rivers and the sea**; **26 FRAs** are in this zone: Bentley, Bingley, Shiplet and Baildon, Brigg, Brighouse, Cleethorpes, Dunscroft, Fazeley, Gilberdyke, Goole, Grimsby, Hebden Bridge, Hedon, Hessle, Huddersfield, Immingham, Kingston-upon-Hull, Leeds, Mirfield, Mytholmroyd, Sheffield, Stainforth, Thorne and Moorends, Thorngumbald, Todmorden, and York. It also identifies 12 FRAs as being at significant risk of flooding from **surface water**; **four FRAs** are in this zone: City of Bradford, City of Sheffield, Kingston-upon-Hull and Haltemprice, and Leeds.

As highlighted in the Humber River Basin District River Basin Management Plan[107], particular **challenges facing the water environment** include: climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

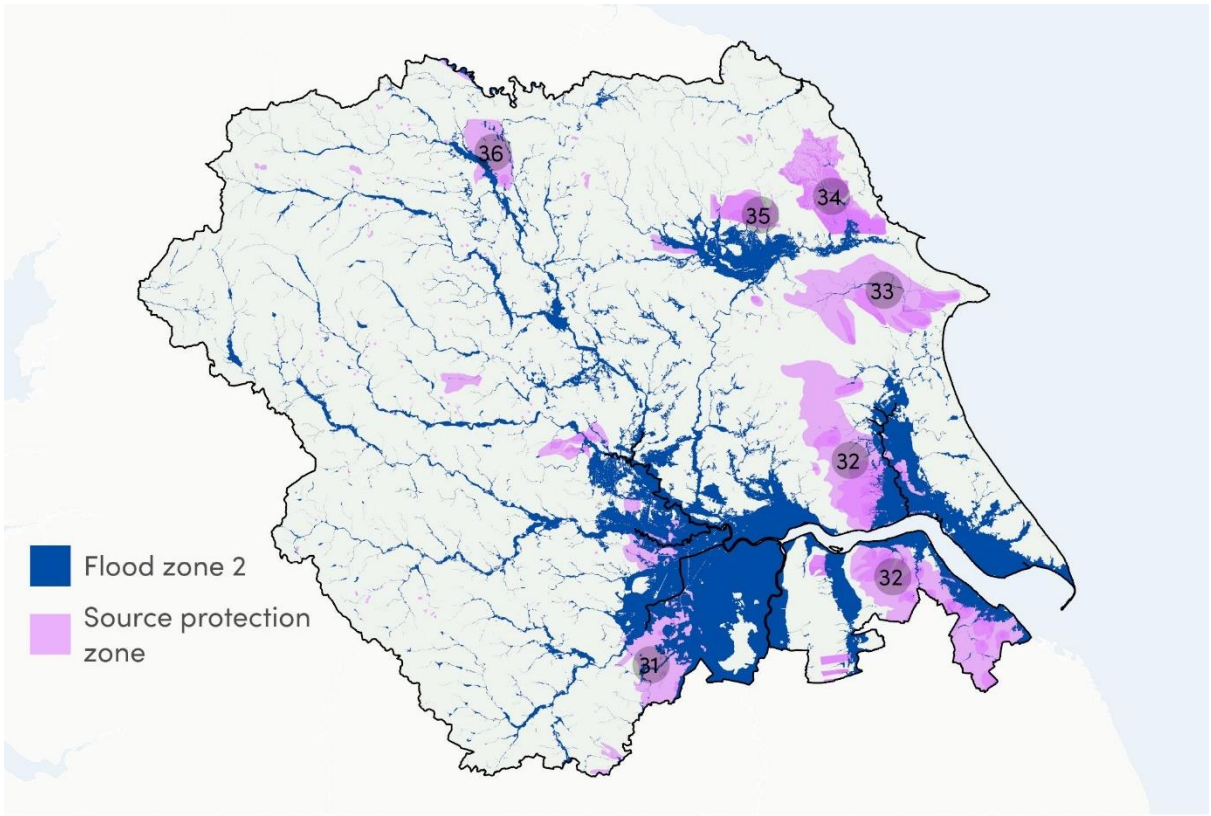


Figure 11.9: Areas of Flood Zone 2 and SPZs and NVZs within Zone T7

As shown in Figure 11.9 above, **SPZs** are mostly present in the vicinity of the Doncaster (**31**), Kingston-upon-Hull (**32**), Bridlington (**33**), Scarborough (**34**), Pickering (**35**), and Northallerton (**36**).

[106] UK Government (2016): Humber River Basin District Flood Risk Management Plan
[107] UK Government (2022): Humber River Basin District River Management Plan

11.10. Key issues for Zone T7

The following key issues have been identified through the review of the baseline information for Zone T7:

- The **industrial sector** is responsible for over a quarter of GHG emissions in the zone.
- The Yorkshire and Humber region is a centre for **carbon capture and storage** technologies.
- The Yorkshire and the Humber region includes significant areas with high levels of **deprivation**, largely located in the former industrial and mining cities and towns. These areas include some of the most deprived communities in England.
- The **Port of Immingham** is the UK's largest port by tonnage, handling around 46 million tonnes of cargo every year.
- The zone has significant **carbon storage** within peatland in the Pennines and the North York Moors National Park.
- Over a quarter of the zone is covered by **National Park** or **National Landscape** status, with three National Parks and five National Landscapes located wholly or partly within Zone T7.
- The zone has a rich and diverse **historic environment** and **archaeological resource**.
- A significant proportion of Yorkshire and the Humber's coastline is designated for its **biodiversity** value.
- The zone has extensive areas covered by the **best and most versatile** agricultural land.
- **13 waterbodies** in Zone T7 are classified as having a **'bad' ecological status**.
- Many lowland parts of the zone are at significant risk of **flooding**, associated with the presence of major river systems such as the Ouse, Aire, Don, Calder and Trent. There have been numerous significant flooding events since 2015.
- **Coastal erosion** on the Holderness coast between Flamborough Head and Spurn Head is a significant issue; the coastline is one of the fastest eroding in Europe.
- Particular challenges facing the **water environment** in Zone T7 include climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

12. Zone T8: East Midlands, England

12.1. Overview of Zone T8

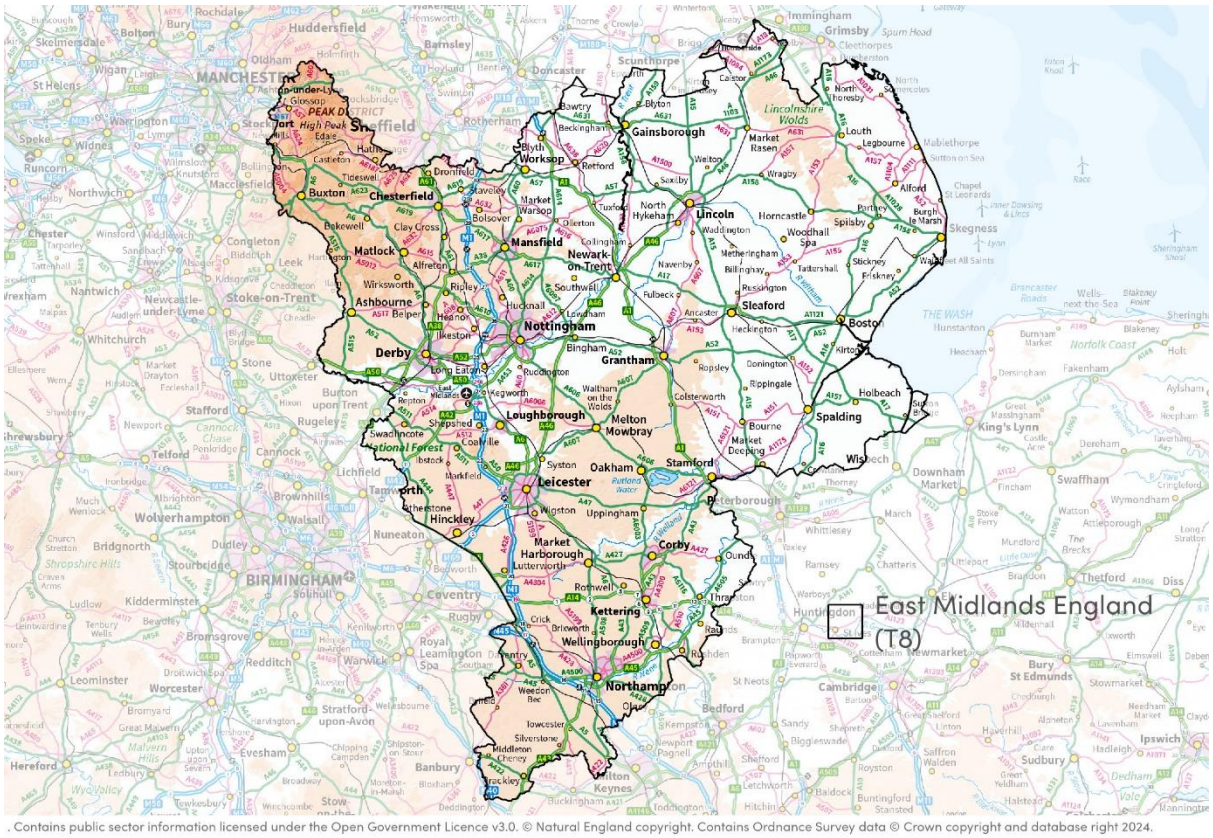


Figure 12.1: Area covered by Zone T8 – East Midlands, England

Zone T8 comprises the East Midlands region of England.

The East Midlands zone (see Figure 12.1 above) covers an area of **15,643 km²**. Located astride the interface of upland and lowland England, the zone ranges from the uplands of the Peak District, through to the industrial landscapes of Derbyshire and Nottinghamshire and agricultural areas of Leicestershire and Northamptonshire, through to the lowland landscapes of the Lincolnshire fens and coast.

The zone has a population of **4.8 million** and contains the major cities of Nottingham, Derby, Leicester, Lincoln as well as numerous other towns such as Northampton, Kettering, Market Harborough, Stamford, Grantham, Chesterfield, Newark-on-Trent, Mansfield, Boston and Skegness.

Parts of the zone are sensitive for their habitats and species, including around the Peak District (and its associated value in terms of natural capital) and coastal areas such as the Wash. The low-lying eastern parts of the zone are particularly vulnerable to flooding whilst also being of high agricultural value and versatility.

The zone has a historically strong manufacturing history with modernisation seeing growth and transformation of the economy.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

12.2. Air quality

Air quality issues in the zone are largely associated with traffic and transport. As highlighted by the location of the **32 AQMAs** in the zone, the largest concentrations of air quality issues are Leicester (**1**), Nottingham (**2**) and Northampton (**3**) (see Figure 12.2 below). The AQMAs in this zone are designated for exceedances in the annual mean concentration objective of 40µg/m^3 for NO_2.

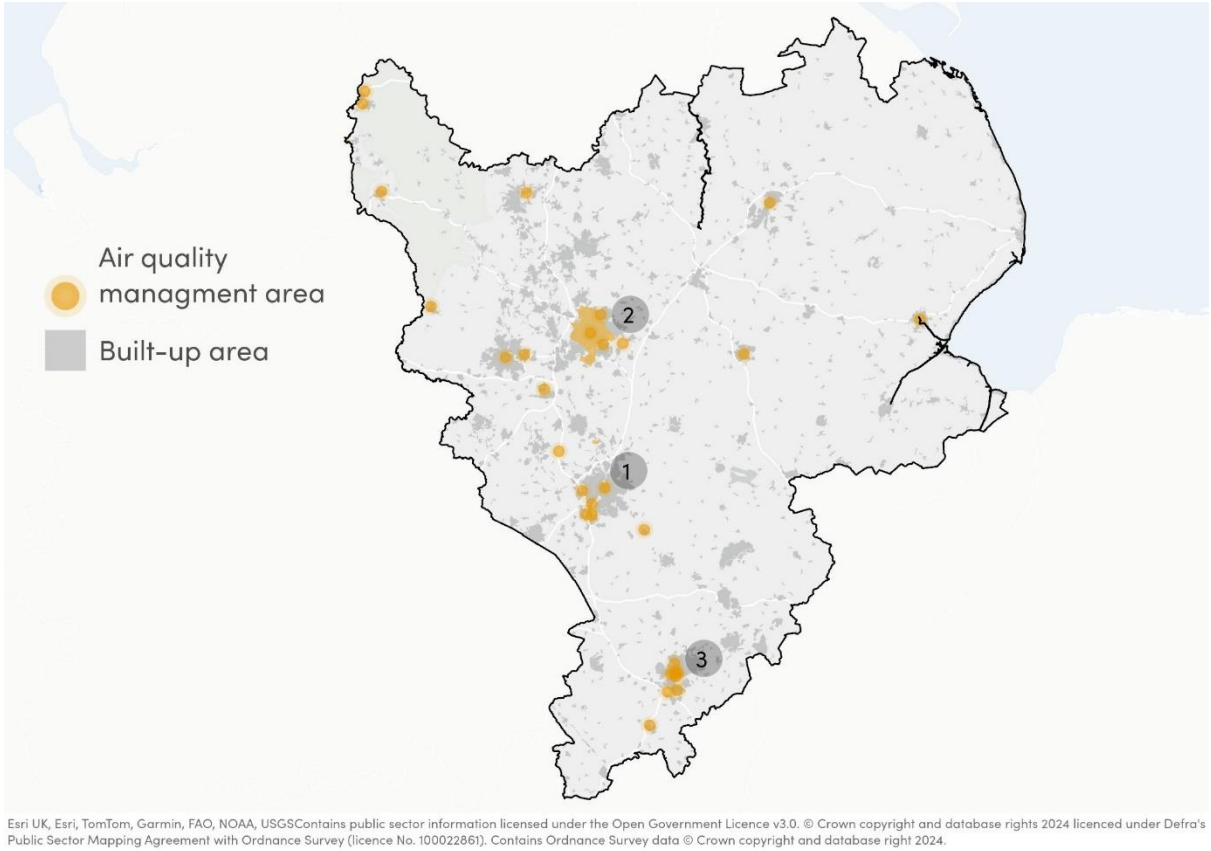


Figure 12.2: AQMAs in Zone T8

12.3. Climate change

In the East Midlands, total greenhouse gas emissions totalled **32,471.1 kt CO_2e** in 2022. The largest contributor to greenhouse gas emissions in 2022 was the **transport sector** (approx. 31.9% of emissions), followed by the industrial sector (approx. 22.1%) and the domestic sector (approx. 18.9%)[108].

[108] UK Government (2022): UK local authority and regional greenhouse gas emissions statistics

There are **carbon stores** in the East Midlands region in the form of peatlands, which are present around the Peak District National Park, Lincoln, and Finningley.[109] This presents opportunities to enhance carbon sequestration and storage – as the restoration of peatland will allow for increased levels of carbon capture. An example of a peatland restoration project in the East Midlands is the planting of sphagnum moss at Kinder Scout in the Peak District[110].

Primary impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections (UKCP18)[111], winters in this zone are anticipated to be 1.25°C warmer between 2021-2040 and 3°C warmer between 2061-2080 in comparison to 1981-2000 (3.75°C). Warmer summers are also anticipated - with a 2.2°C increase anticipated for 2021-2040, and a 5.05°C increase for 2061-2080 in comparison to 1981-2000 (15.07°C). Winters in this zone are anticipated to be wetter (increasing to 3.25mm/day in 2061-2080 in comparison to 2.75mm/day in 1981-2000), and drier in the summer (decreasing to 1.34mm/day in 2061-2080 in comparison to 1.95mm/day in 1981-2000)[112].

Secondary impacts from climate change are largely linked to changes in temperature, humidity and precipitation. These can be widespread and impact upon ecosystems, people, settlements and infrastructure. Changes in precipitation patterns can lead to an increase in flood events or the occurrence of drought, which can impact on agriculture and natural resources. Increased temperatures can also result in heat-related human mortality, and cause species loss. Additionally, higher temperatures and the occurrence of heatwaves can aggravate air pollution events and also limit the function of key infrastructure – including compromising energy systems. The Intergovernmental Panel on Climate Change (IPCC) outlines that the energy sector is climate-exposed, indicating that energy infrastructure will become increasingly vulnerable if design standards do not account for changing climate conditions[113]. Infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems are viewed as the most feasible adaptation techniques – alongside energy generation diversification (i.e., a greater use of renewable energy)[114].

12.4. Community wellbeing

The population of the East Midlands region is **4,880,054** (ONS Census 2021). It has a population density of 312.4 residents per square km, with higher densities in urban areas in major cities and towns.

[109] Natural England (no date): Peaty Soils Location (England)
[110] National Trust (2024): Sphagnum moss planted on Kinder Scout will act as 'speed-bumps' to help restore peatland and protect people from flooding
[111] Met Office (no date): UKCP data
[112] Based on the RCP8.5 emissions scenario, which assumes there is fast population growth, low technical development rate, slow GDP growth, a massive increase in world poverty and high energy use and emissions. It also assumes no climate change mitigation or adaptation techniques are engaged with.
[113] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[114] IPCC (2019): Climate Change and Land

In terms of its age profile, the East Midlands has a slightly higher percentage of people of **retirement age** and above, at 19.4% compared to the English average of 18.3% (see Figure 12.3 overleaf). A similar proportion of the population to the English average is aged 15 and under and of working age (Census 2021).

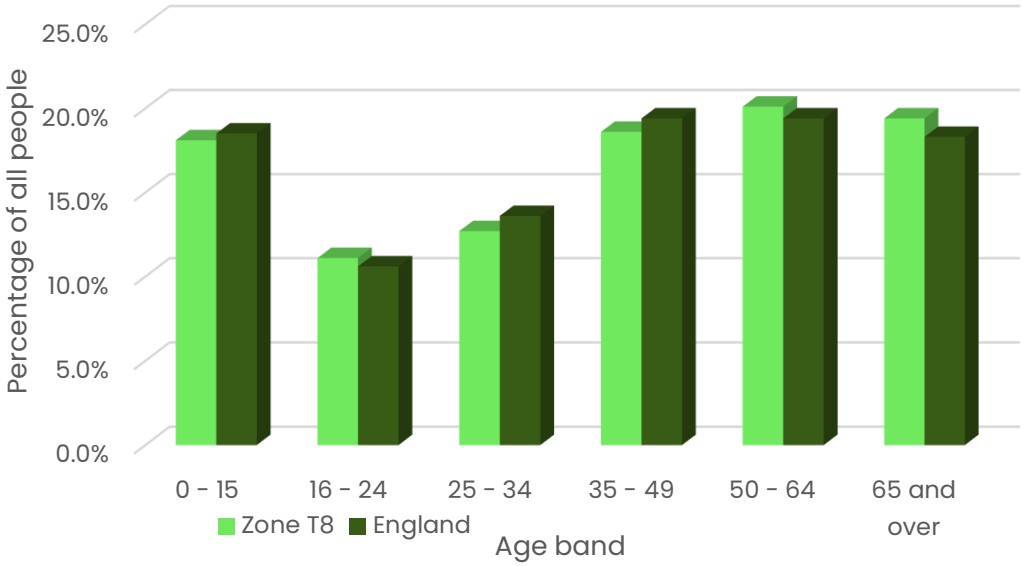


Figure 12.3: Age profile of Zone T8 (source ONS Census 2021)

IMD data from 2019 shows that the East Midlands includes areas of **high levels of deprivation**. Located mostly in the larger cities of Derby, Nottingham and Leicester and the former industrial and mining areas in Derbyshire and Nottinghamshire, these include some of the most deprived communities in England. The zone also includes coastal towns and areas with high levels of deprivation including Skegness and Mablethorpe.

Key 'traditional' economic sectors in the zone include textile manufacturing, car and rail manufacturing, agriculture and coal mining. The East Midlands' central location and good transport links have also traditionally made it an important location for the transportation and logistics sector. Other economic sectors also include industries related to healthcare and life sciences and digital and creative industries.

In Zone T8, the industries with the **highest regional GVA in 2022**[115] were the services sector and production sector.

The region is served by a comprehensive **rights of way network** within settlements and across the countryside. Most of the region is poorly served by National Trails, but the north west of the region partly includes the Pennine Way and Pennine Bridleway National Trails and their starting points in Edale and Middleton Top. This area also includes the Peak District National Park and numerous nature-based recreational and leisure paths and routes.

[115] ONS (2024): Regional gross value added (balanced) by industry: all ITL regions

12.5. Cultural heritage and historic environment

The East Midlands is a diverse region from a **historic landscape** perspective, with a close interaction between human activity and the environment. Located astride the interface of upland and lowland England, the zone ranges from the uplands of the Peak District, through to the industrial landscapes of Derbyshire and Nottinghamshire and agricultural areas of Leicestershire and Northamptonshire, through to the historic landscapes of the Lincolnshire fens and coast. These landscapes have closely influenced the historic evolution of Zone T8.

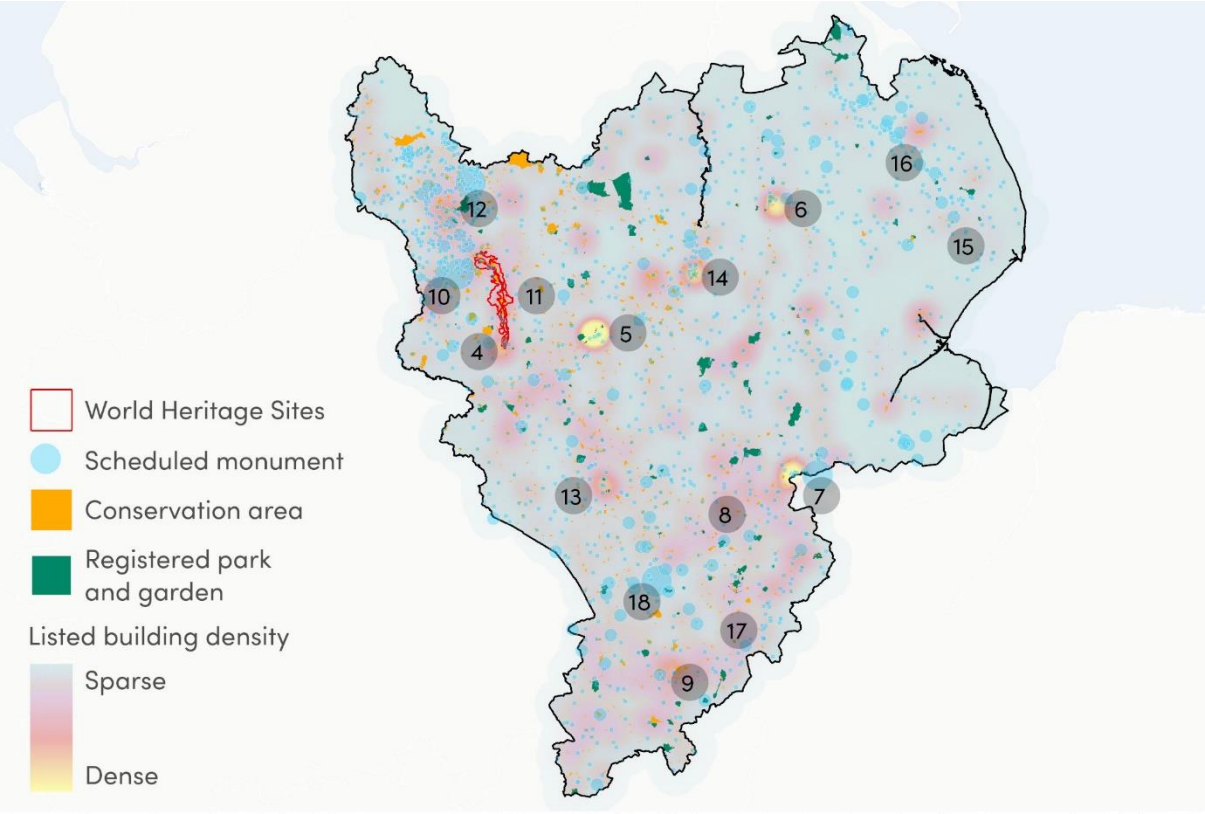


Figure 12.4: Designated heritage assets within Zone T8

In terms of historic environment designations (see Figure 12.4 above), particular clusters of **listed buildings** and **conservation areas** are located in the larger settlements of Derby (**4**), Nottingham (**5**) and Lincoln (**6**). There are also significant clusters in Stamford (**7**) and Rutland (**8**), and in rural Northamptonshire (**9**), and Leicestershire (**10**).

There are also particular clusters in the Derwent valley (**11**), which has been inscribed as the **Derwent Valley WHS**. The WHS, located upstream from Derby on the southern edge of the Pennines, contains a series of 18th and 19th century cotton mills and an industrial landscape of high historical and technological significance. The modern factory owes its origins to the mills at Cromford, where Richard Arkwright's inventions were first put into industrial-scale production. The workers' housing associated with the area remains intact and illustrate the socio-economic development of the area. Much of the landscape setting of the mills and the industrial communities has survived.

The zone has a large number of **registered parks and gardens**, reflecting the historic wealth of the area stemming from agriculture and industry. These include the well-known parkscapes of Chatsworth House, Hardwick Hall, Belton House, Grimsthope Castle, Boughton House, Castle Ashby, and Dreyton House.

Zone T8 also has a rich archaeological resource. Particular clusters of **scheduled monuments** are located on the eastern edge of the Peak District in Derbyshire. This includes the East Moors (**12**), comprising the gritstone moors east of the River Derwent. As a result of recent and on-going archaeological survey, the East Moors area is becoming one of the best recorded upland areas in England for archaeology. Finds in this area represent extensive areas for human exploitation of the gritstone uplands from the Neolithic to the post-medieval periods, particularly during the Bronze Age.

Other locations with particular concentrations of **archaeological finds** include: bowl barrows dating from the late Neolithic period to the Late Bronze Age located north west of Ashbourne (**13**); Roman and medieval defensive structures in the vicinity of Newark-on-Trent (**14**); on the edge of the Lincolnshire Fens (**15**) (reflecting the historical settlement patterns before the Fens were drained in the 17th century); Neolithic and medieval remains on the ridgeways of the Lincolnshire Wolds (**16**); along the Nene Valley in Northamptonshire (**17**); a cluster of medieval remains near Clipston (**18**); and Roman and medieval remains in Lincoln.

12.6. Ecology and biodiversity

Priority habitats are present across the region and represent a diverse range of habitats and support a wide variety of species. Particularly extensive areas of priority habitat are shown in Figure 12.5 overleaf, and include:

- Blanket bog and upland heathland in the South Pennine Moors (**19**)
- Coastal saltmarsh and mudflats in The Wash (**20**)

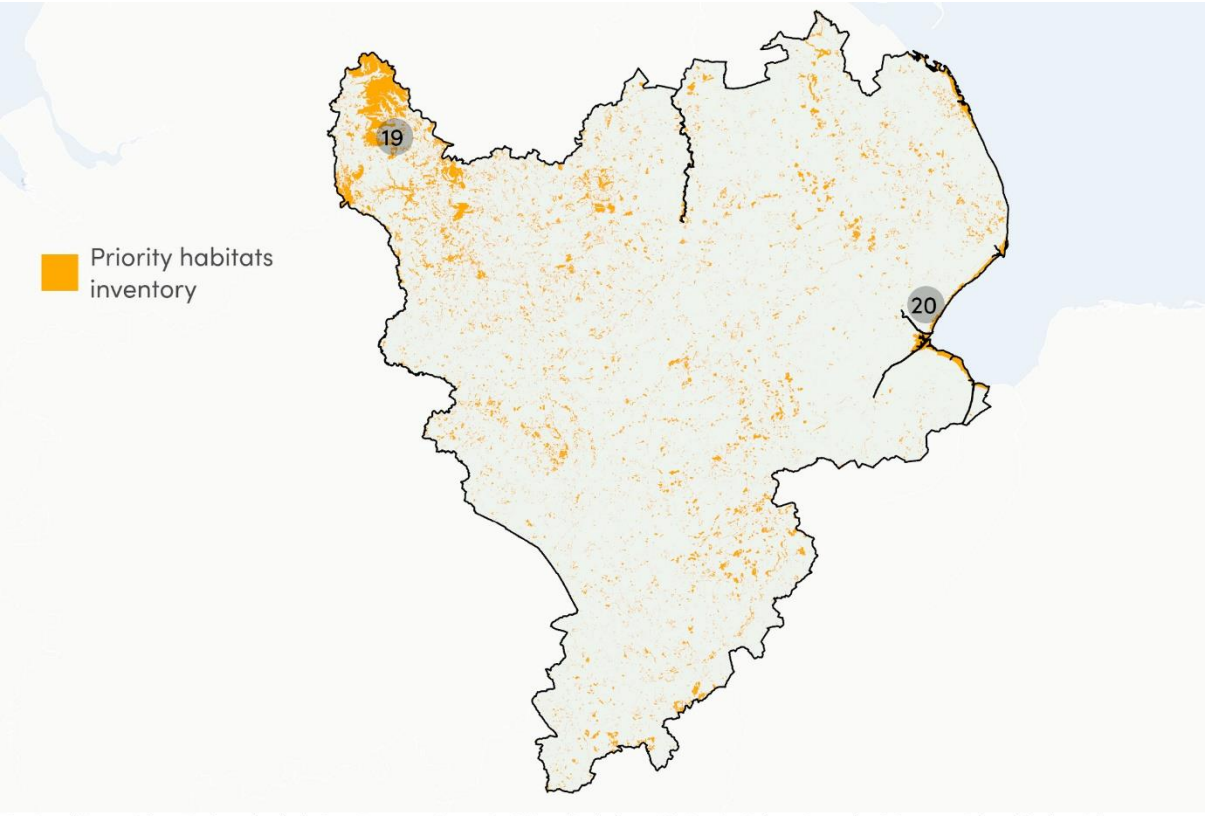


Figure 12.5: Cover of priority habitats in Zone T8

Overall, the area covered by **SAC** designations (including possible SACs) is 33,981 ha (2.2% of the zone); the area covered by **SPA** designations (including potential SPAs) is 34,933 ha (2.23% of the zone); and the area covered by **Ramsar site** designations (including proposed Ramsar sites) is 9,543 ha (0.6% of the zone). Internationally designated sites for biodiversity that cover these habitats, are outlined below:

- The South Pennine Moors SAC and Peak District Moors (South Pennine Moors Phase 1) SPA (**21**)

The area covered by **SSSI** designations is 51,317 ha (3.3% of the zone). Nationally designated sites for biodiversity that cover these habitats, are outlined below:

- Dark Peak SSSI (**21**)

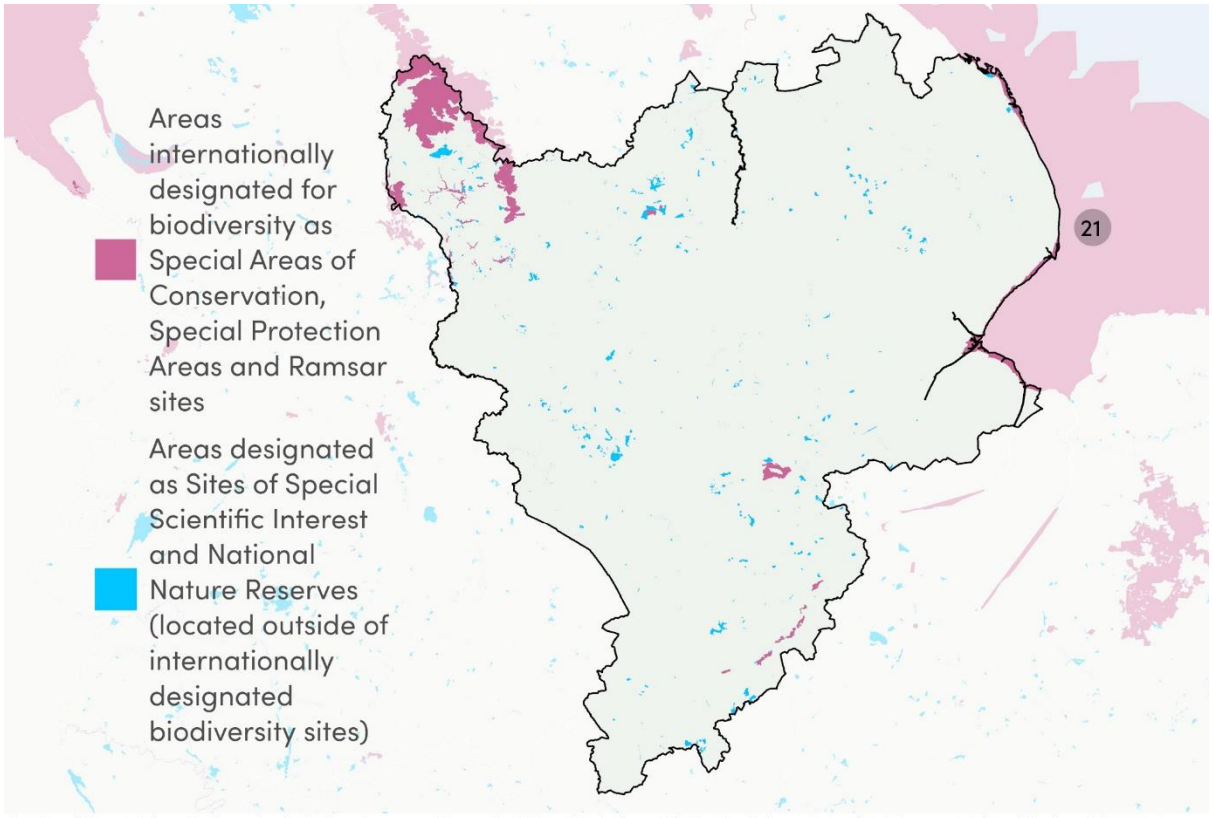


Figure 12.6: Internationally and nationally designated sites for biodiversity in Zone T8

The percentage of the zone covered by **ancient woodland** is 1.5%, totalling 23,140 ha.

12.7. Land and soil resources

With regard to ALC, as shown in Figure 12.7 overleaf, Zone T8 exhibits some varied agricultural land quality associated with the changing topography across the area. The higher land in the north west of the zone in and around the Peak District and Derbyshire Dales (**22**) offer land with **grade 4** (poor) agricultural potential. The Lincolnshire Edge escarpment feature running north to south separates central Lincolnshire, with land to the west (**23**) largely comprised of **grade 3** (good to moderate) agricultural land.

With large areas of **BMV** agricultural land, the fenland areas of Lincolnshire are amongst the most productive arable lands in the UK (**24**). Overall, 25% of the zone comprises **grades 1 and 2** (excellent to very good) agricultural land.

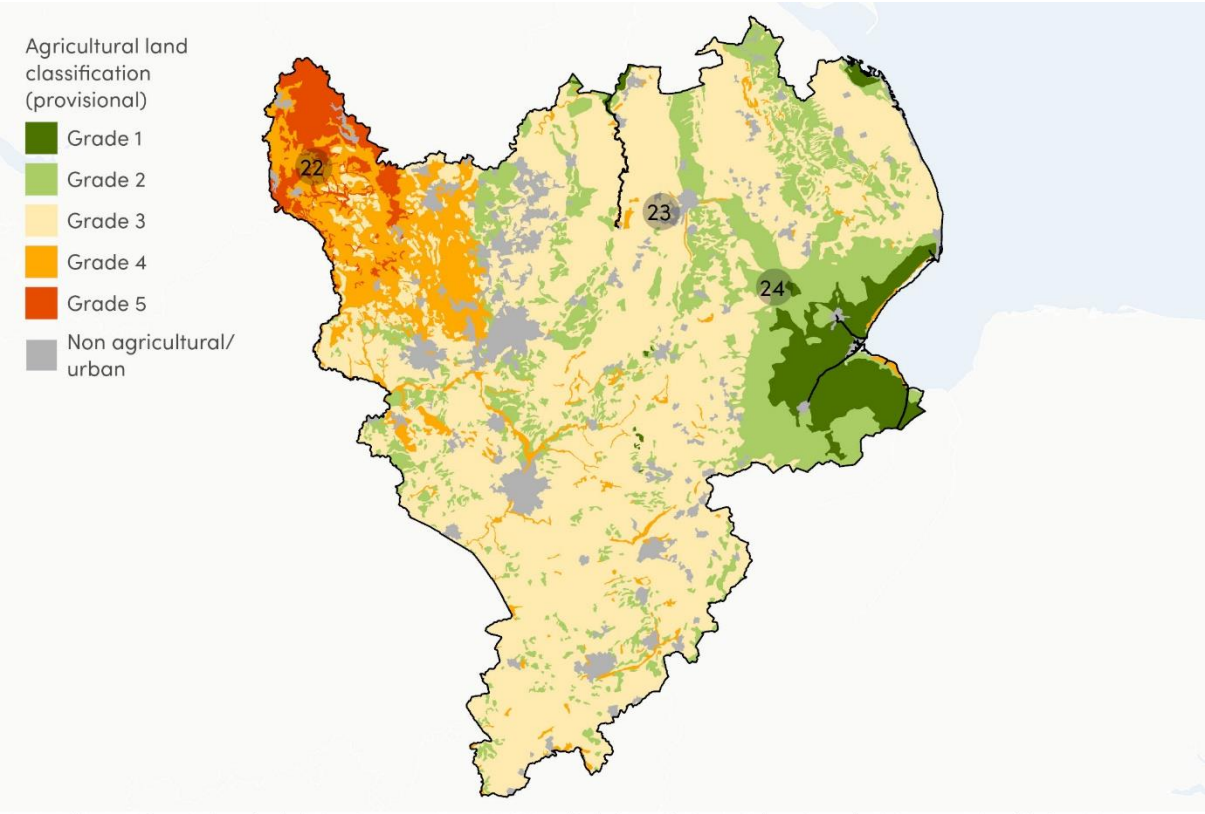


Figure 12.7: Agricultural land classification across Zone T8

12.8. Landscape and seascape

Zone T8 has a diverse range of landscapes, representing a significant breadth of landscape and seascape types which reflect the interplay of area's topography, geology, biodiversity, land uses and cultural heritage.

To the north-west of Zone T8, the landscape is dominated by the **rolling hills** of the Derbyshire Dales, with **limestone valleys** and scattered **woodlands**. To the east, the zone transitions into flat, expansive **fenlands** known for their agricultural productivity.

Inland, the **River Soar** flows through Leicester, and the **River Nene** passes through Northampton, with both rivers shaping the surrounding fertile **agricultural land**.

Zone T8 has a rich **industrial heritage**, which has shaped the landscape within and surrounding its urban centres. For example, Nottingham has a history of lace manufacturing and textiles, while Derby has strong associations with the railway industry. **Coal mining** has also significantly shaped the local landscape across the zone, with towns like Mansfield and Worksop being particular hotspots for these activities.

Part of Zone T8 (9.0%) is covered by National Park or National Landscape status: the percent of the zone covered by National Parks is 5.7% (89,519 ha); and the percent covered by National Landscapes is 3.3% (51,948 ha).

The majority of **Peak District National Park** is located in Zone T8 (see Figure 12.8 below). Its special qualities include dramatic rock edges and wild moorlands; tranquil dales; ancient

woodlands; limestone caves; tranquillity; an extensive network of public rights of way; traditional farming practices; clean water; many historic buildings and structures.

One National Landscape is located wholly or partly within Zone T8 (see Figure 12.8 below). This is **Lincolnshire Wolds**, which is characterised by gentle hills and valleys, and including notable areas such as Market Rasen and Caistor.

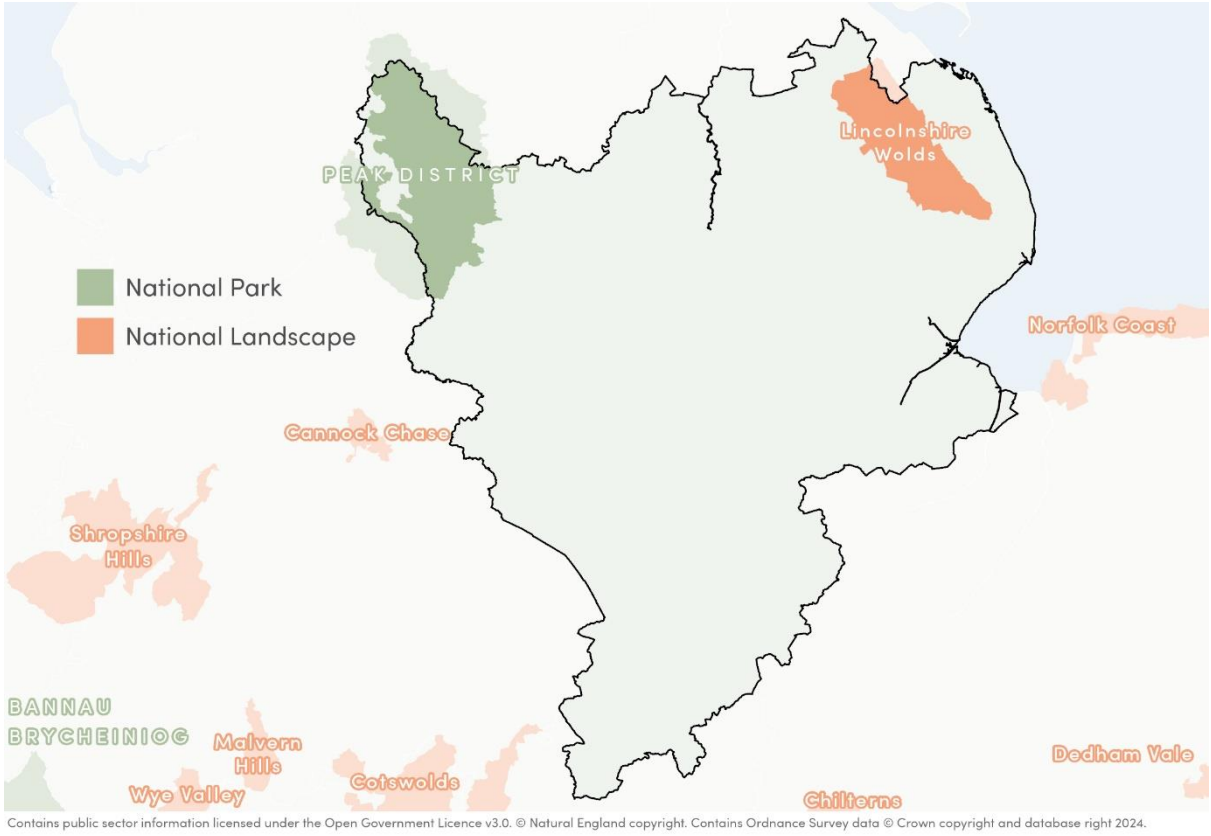


Figure 12.8: Designated landscapes within Zone T8

12.9. Water

According to the WFD river classification data (2019), **18 waterbodies** in Zone T8 are classified as having a **'bad' ecological status**. These are:

- Barnwell Brook
- Car Dyke North and Delph System
- Chater – Upper
- Dunston Beck
- East & West Fen Drains
- Fosdyke Bridge Outfall
- Great Eau (upstream of South Thoresby)
- Harrowden Brook (Nene)
- Hemington Brook Catchment (trib of the Soar)
- Jordan (Welland)
- Morcott Brook
- New Dike Catchment (trib of Louth Canal)

- Nut Brook Catchment (trib of Erewash)
- South Gwash
- Stonton Brook
- The Fleet Upper Catchment (trib of Trent)
- The Moss from Source to River Rother
- Uppingham Brook

The River Basin District Flood Risk Management Plans that cover Zone T8, and the **FRAs** which falls within the zone, are set out below:

- The **Humber** River Basin District Flood Risk Management Plan 2021 to 2027[116] identifies 38 FRAs for significant risk of flooding from **main rivers and the sea**; **12 FRAs** are in this zone: Beeston (Broxtowe), Burton-upon-Trent, Derby, Fazeley, Gunthorpe, Leicester, Long Eaton, Loughborough, Louth, Newark-on-Trent, Nottingham, and West Bridgford. It also identifies 12 FRAs as being at significant risk of flooding from **surface water**; **seven FRAs** are in this zone: Chesterfield, Derby, Hinckley & Burbage, Leicester, Loughborough, Mansfield, and Nottingham.
- The **Anglian** River Basin District Flood Risk Management Plan 2021 to 2027[117] identifies 16 FRAs for significant risk of flooding from **main rivers and the sea**; **seven FRAs** are in this zone: Boston, Horncastle, Lincoln, Mablethorpe, Northampton, Skegness, and Spalding. It also identifies 12 FRAs as being at significant risk of flooding from **surface water**; **three FRAs** are in this zone: Market Harborough, Northampton, and Oakham. In addition, the plan identifies eight FRAs at risk of **tidal flooding**; **four FRAs** are in this zone: Boston, Mablethorpe, Skegness, and Spalding.

As highlighted in the Humber[118] and Anglian[119] River Basin District River Basin Management Plan, particular **challenges facing the water environment** include: climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

[116] UK Government (2016): Humber River Basin District Flood Risk Management Plan
[117] UK Government (2016): Anglian River Basin District Flood Risk Management Plan
[118] UK Government (2022) Humber River Basin District River Basin Management Plan
[119] UK Government (2022): Anglian River Basin District River Basin Management Plan

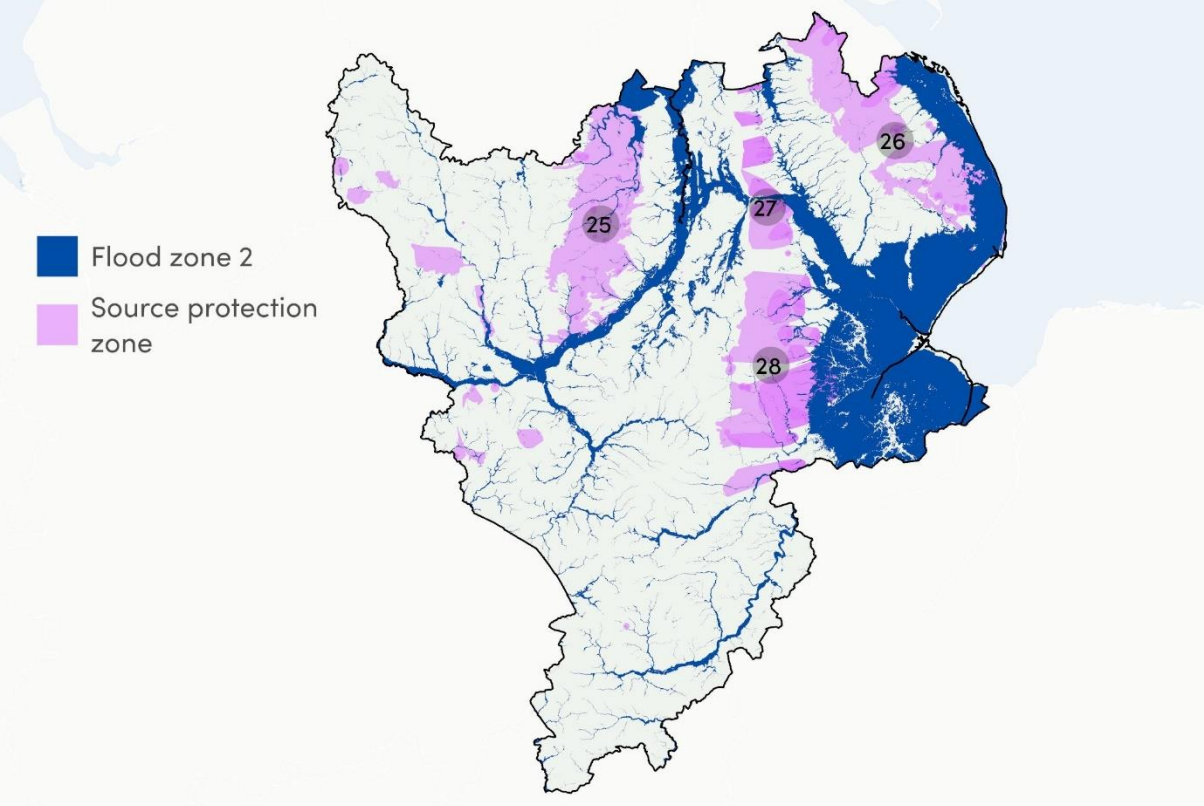


Figure 12.9: Areas of Flood Zone 2 and SPZs and NVZs within Zone T8

As shown in Figure 12.9 above, **SPZs** are mostly present in the vicinity of the Nottingham and Worksop (**25**), Louth (**26**), Lincoln (**27**), and Sleaford and Bourne (**28**).

12.10. Key issues for Zone T8

The following key issues have been identified through the review of the baseline information for Zone T8:

- **Carbon stores** in the form of peatlands are present around the Peak District National Park, Lincoln, and Finningley.
- The East Midlands includes areas of **high deprivation**. Located mostly in the larger cities of Derby, Nottingham and Leicester and the former industrial and mining areas in Derbyshire and Nottinghamshire, these include some of the most deprived communities in England. The zone also includes coastal towns and areas with high levels of deprivation including Skegness and Mablethorpe.
- Western parts of the zone have a rich **industrial heritage**, as highlighted by the presence of the Derwent Valley WHS.
- The zone has a rich **archaeological resource**, particularly on the eastern edge of the Peak District in Derbyshire, the edge of the Linconshire fens, the ridgeways of the Lincolnshire Wolds and along the Nene Valley in Northamptonshire.
- The zone has a large number of registered **parks and gardens**, reflecting the historic wealth of the area stemming from agriculture and industry.

- A significant proportion of the zone's coastline is internationally designated for its **biodiversity** value, including the Wash SAC, SPA and Ramsar site.
- The majority of **Peak District National Park** is located in Zone T8. The Lincolnshire Wolds has also been designated as a **National Landscape**.
- With large areas of the **best and most versatile** agricultural land, the fenland areas of Lincolnshire are amongst the most productive arable lands in the UK.
- **18 waterbodies** in Zone T8 are classified as having a **'bad' ecological status**.
- Many parts of the zone are at significant risk of fluvial, surface water and coastal **flooding**, with numerous significant flooding events taking place since 2015.
- Particular challenges facing the **water environment** include climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

13. Zone T9: West Midlands, England

13.1. Overview of Zone T9

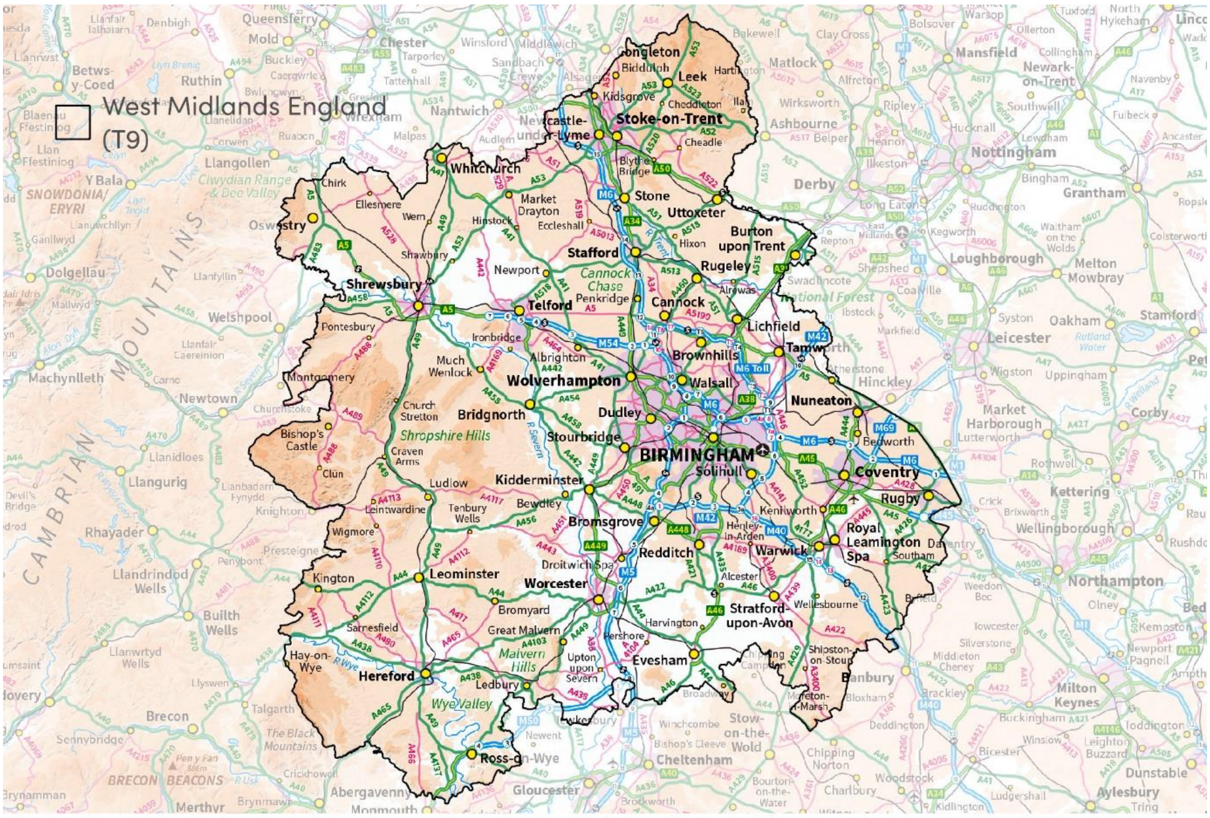


Figure 13.1: Area covered by Zone T9 – West Midlands, England

Zone T9 comprises the West Midlands region of England.

The West Midlands zone (see Figure 13.1 above) is a landlocked region in England with an area of **13,004 km²** and a shared border with Wales. The zone has a population of approximately **six million** people, with some significant urban areas, including Birmingham, Coventry, Wolverhampton and Stoke-on-Trent, with approximately 9-10% of the zone built-up. The area contains some more rural counties, including Herefordshire, Shropshire, Staffordshire, Worcestershire and Warwickshire, with areas of significant agricultural activity.

There are a number of high value landscapes across the zone, with five National Landscapes and one National Park within (or partly within) its boundaries.

The West Midlands' industrial past is seeing some shifts towards services, technology, advanced manufacturing and logistics. These industries have promoted strong economic growth and take advantage of strong transport links with the rest of the country.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

13.2. Air quality

Air quality issues in the zone are largely associated with traffic and transport. As highlighted by the location of the **37 AQMAs** in the zone, distribution here is largely concentrated within the Birmingham and the Black Country conurbation, Coventry, Rugby, Stoke and Trent and Worcester (see Figure 13.2 below). These are primarily designated for exceedances in the annual mean concentration objective of 40µg/m^3 for NO_2, though a couple of the AQMAs are also designated for exceedances in the hour mean concentration objective of 200µg/m^3 for NO_2 – including in **Stoke on Trent** (**1**), and **Walsall** (**2**). The AQMA in **Wolverhampton** (**3**) also undertakes monitoring for PM_{10} due to exceedances in the 24 hour mean concentration objective of 50µg/m^3 for this pollutant, which is linked to dust associated with vehicle movements in the city centre.

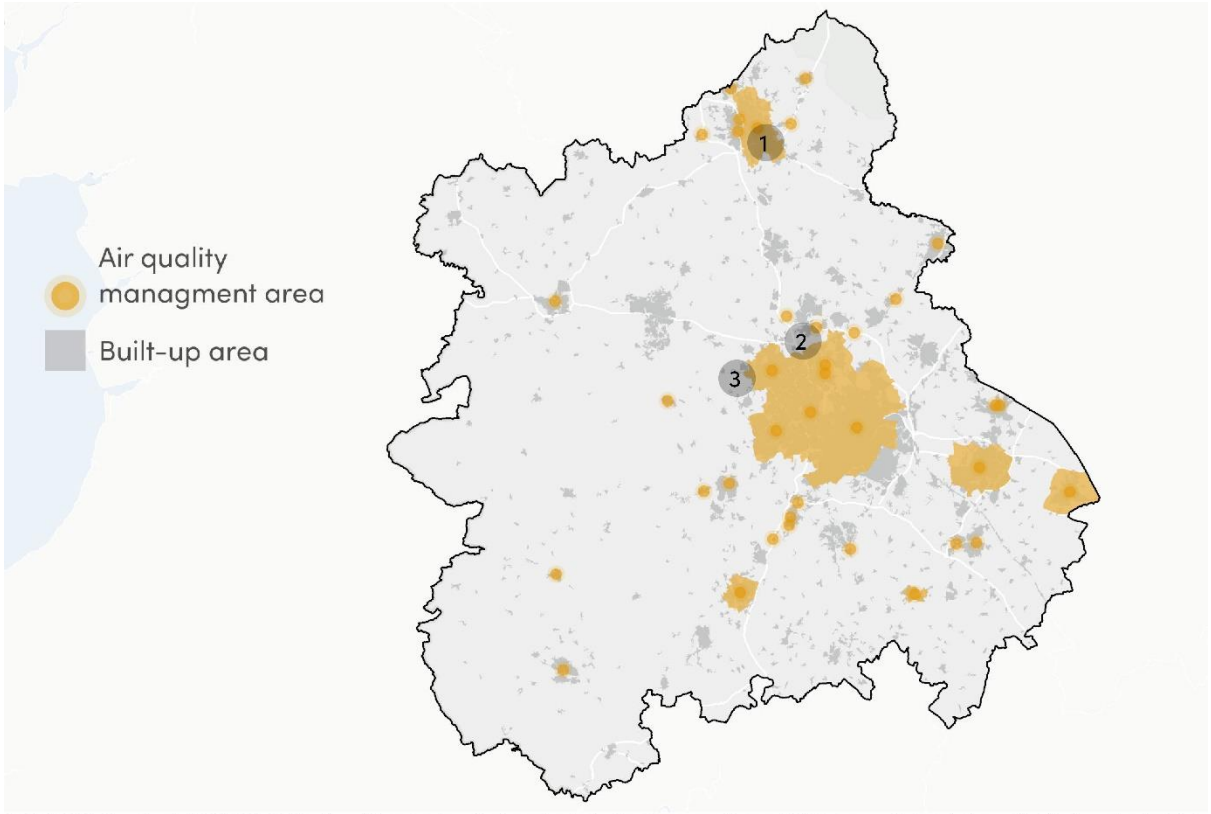


Figure 13.2: AQMAs in Zone T9

13.3. Climate change

The West Midlands contributed a total of **32,367.9 kt CO_2e** to UK greenhouse gas emissions in 2022. The largest contributor was the **transport sector**, which was responsible for

approx. 34.9% of emissions in 2022. This is followed by the domestic sector (approx. 22% of emissions) and the industrial sector (approx. 15.6%)[120].

This zone has some **carbon storage potential**. In 2022, the **land use, land use change and forestry sector** captured and stored 253.7 kt CO_2e in the West Midlands[121], which helped to reduce overall emissions. According to data collected in 2023, there are an estimated 4,918,000 trees in the West Midlands which store approx. 1,912,000 tonnes of carbon. These trees sequester approximately 57,620 tonnes of carbon every year, as well as remove approximately 206 tonnes of pollutants and contribute to natural flood risk management[122].

Primary impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections (UKCP18)[123], winters in this zone are anticipated to be 1.2°C warmer between 2021-2040 and 2.96°C warmer between 2061-2080 in comparison to 1981-2000 (3.91°C). Warmer summers are also anticipated - with a 2.17°C increase anticipated for 2021-2040, and a 5.09°C increase for 2061-2080 in comparison to 1981-2000 (14.99°C). Winters in this zone are anticipated to be wetter (increasing to 3.34mm/day in 2061-2080 in comparison to 2.83mm/day in 1981-2000), and drier in the summer (decreasing to 1.3mm/day in 2061-2080 in comparison to 2mm/day in 1981-2000)[124].

Secondary impacts from climate change are largely linked to changes in temperature, humidity and precipitation. These can be widespread and impact upon ecosystems, people, settlements and infrastructure. Changes in precipitation patterns can lead to an increase in flood events or the occurrence of drought, which can impact on agriculture and natural resources. Increased temperatures can also result in heat-related human mortality, and cause species loss. Additionally, higher temperatures and the occurrence of heatwaves can aggravate air pollution events and also limit the function of key infrastructure – including compromising energy systems. The Intergovernmental Panel on Climate Change (IPCC) outlines that the energy sector is climate-exposed, indicating that energy infrastructure will become increasingly vulnerable if design standards do not account for changing climate conditions[125]. Infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems are viewed as the most feasible adaptation techniques – alongside energy generation diversification (i.e., a greater use of renewable energy)[126].

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[120] UK Government (2022): UK local authority and regional greenhouse gas emissions statistics
[121] Ibid.
[122] Treeconomics (no date): Valuing Birmingham's Urban Forest
[123] Met Office (no date): UKCP data
[124] Based on the RCP8.5 emissions scenario, which assumes there is fast population growth, low technical development rate, slow GDP growth, a massive increase in world poverty and high energy use and emissions. It also assumes no climate change mitigation or adaptation techniques are engaged with.
[125] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[126] IPCC (2019): Climate Change and Land

13.4. Community wellbeing

The population of the West Midlands region is **5,950,757** (ONS Census 2021). It has a population density of 457.8 residents per square km, although the population density varies throughout the area with higher densities in urban areas including the Black County-Birmingham conurbation, Coventry and Stoke-on-Trent.

In terms of its age profile, of the nine English regions, the West Midlands has the highest percentage of people **aged 15 and under**, at 19.3% (see Figure 13.3 overleaf). Other age bands broadly align with the English averages (ONS Census 2021).

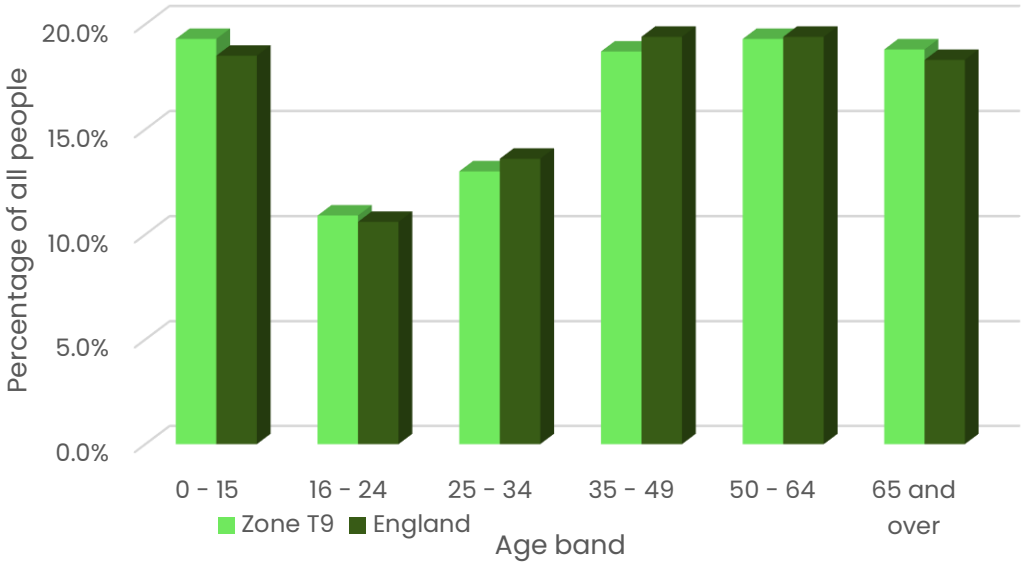

Figure 13.3: Age profile of Zone T9 (source ONS Census 2021)

IMD data from 2019 shows that the zone includes some of the **most deprived** communities in England, including in Birmingham, Dudley, Sandwell, Stoke-on-Trent and Wolverhampton. Other particular pockets of deprivation are in Coventry, Burton on Trent, Nuneaton, Tamworth and Redditch.

Key 'traditional' economic sectors in the zone include car manufacturing, steel production, textile and jewellery manufacturing, ceramics, and coal mining. Current economic sectors also include a growing financial and professional services sector, digital and creative industries and retail and hospitality.

In Zone T9, the industries with the **highest regional GVA in 2022**[127] were the services sector and production sector.

The zone has a comprehensive **rights of way network**. The Offa's Dyke Path National Trail runs through the west of the zone.

[127] ONS (2024): Regional gross value added (balanced) by industry: all ITL regions

13.5. Cultural heritage and historic environment

The West Midlands, which comprises Zone T9, has a rich and diverse historic environment and cultural heritage resource. The distribution and diversity of heritage features reflect the historic evolution of the region from prehistoric times, incorporating:

- Neolithic and early Bronze Age settlement; Roman history.
- The area's role as a centre for Anglo-Saxon Mercia.
- The building of numerous castles including in Warwick, Shropshire and Herefordshire following the Norman invasion.
- The development of Coventry as a wool and cloth manufacturing centre and the development of market towns such as Stratford-upon-Avon during the medieval period.
- The development of Leamington Spa as a royal spa town in the late 18th and early 19th century.

Drawing on its abundant natural resources and position at the centre of England, the West Midlands subsequently became a centre for the development of the canal network and the industrial revolution in 18th and 19th centuries. For example, Ironbridge Gorge, discussed in more detail below, was a key node for the early industrial revolution in the 18th century, Stoke-on-Trent became a centre for the Staffordshire Potteries industry from the 18th century, Warwickshire was a key centre for medieval and early modern commerce and trade (and has a rich cultural heritage associated with the legacy of Shakespeare), and the **Black Country's** (**4**) significant industrial heritage is linked to the local presence of coal, iron ore and limestone deposits which provided a ready source of raw materials. Alongside, **Birmingham** (**5**) built on its history of industry dating back to the 16th century and became a centre for the skilled manufacture of smaller articles, such as buttons, guns, and jewellery, and with **Coventry** (**6**), became a centre for car making in the 20th century.

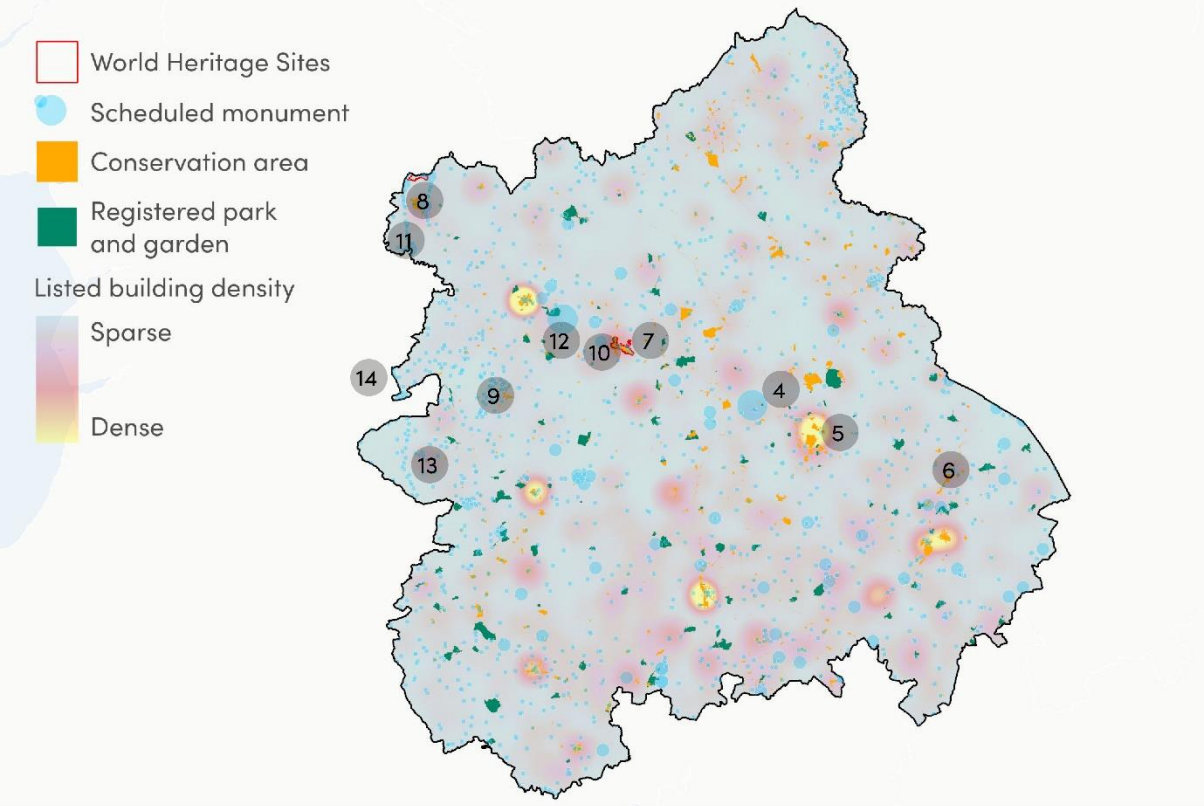

Figure 13.4: Designated heritage assets within Zone T9

Linked to the region's evolution during the industrial revolution, the zone includes **two WHSs** (see Figure 13.4 above), which are detailed below:

- **Ironbridge Gorge** (**7**): The WHS covers an area of 5.5 km² (550 ha) and is located in Shropshire, approximately 50 km north-west of Birmingham. The Industrial Revolution had its 18th century roots in the Ironbridge Gorge and spread worldwide leading to some of the most far-reaching changes in human history. The site incorporates a 5 km length of the steep-sided, mineral-rich Severn Valley from a point immediately west of Ironbridge downstream to Coalport, together with two smaller river valleys extending northwards to Coalbrookdale and Madeley. The property contains substantial remains of mines, pit mounds, spoil heaps, foundries, factories, workshops, warehouses, iron masters' and workers' housing, public buildings, infrastructure, and transport systems, together with the traditional landscape and forests of the Severn Gorge. In addition, there also remain extensive collections of artifacts and archives relating to the individuals, processes and products that made the area so important.
- **Pontcysyllte Aqueduct and Canal** (**8**): Located on the Welsh borders north of Oswestry in Shropshire, the 18 km long Pontcysyllte Aqueduct and Canal is a feat of civil engineering of the Industrial Revolution, completed in the early years of the 19th century. Covering a difficult geographical setting, the building of the canal required substantial, bold civil engineering solutions, especially as it was built without using locks. The Pontcysyllte Aqueduct and Canal are early and outstanding examples of the innovations brought about by the Industrial Revolution in Britain, where they made decisive development in transport capacities possible. They bear witness to very

substantial international interchanges and influences in the fields of inland waterways, civil engineering, land-use planning, and the application of iron in structural design.

In response to the industrial revolution, urban areas across the West Midlands grew rapidly, and by the 20th century the Black Country and Birmingham had grown into one large conurbation. However, the Black Country's coal mining industry was in decline by the early 20th century and heavy industry more widely began to decline in the 1970s and 1980s, with towns including Bilston, Darlaston, Wednesbury, Tipton and Brierley Hill being hit particularly hard by factory closures. Whilst there have been significant regeneration efforts across the Birmingham/Black Country which have sought to utilise the area's historic environment as an anchor, given the above context there are a significant number of features and areas 'at risk', with approximately 400 features in the West Midlands listed on Historic England's Heritage at Risk Register. These have been identified as being at risk of loss due to neglect, decay or inappropriate development. Industrial heritage in West Midlands however remains a key opportunity for heritage led regeneration across the region.

Zone T9's archaeological resource is diverse. Particular concentrations of **scheduled monuments** include (see Figure 13.4 above): in Shropshire around **Church Stretton** (**9**), where large numbers of Neolithic and Bronze Age barrows associated with the ancient track way of The Portway can be found; the area around **The Wrekin** (**10**), capped by a 20 acre Iron Age hill fort; around **Oswestry** (**11**), highlighting the rich heritage of the area including the Old Oswestry Hillfort; Roman sites around **Wroxeter** (**12**); and large sections of **Offa's Dyke** (**13**), the longest archaeological monument in Britain built by the 8th Century King Offa between Britain and Mercia. There are also significant concentrations of scheduled monuments in the **Welsh borderlands** (**14**), including the largest concentration of castles and motte and baileys from the Norman period.

13.6. Ecology and biodiversity

Priority habitats are present across the region and represent a diverse range of habitats and support a wide variety of species. Particularly extensive areas of priority habitat are shown in Figure 13.5 overleaf, and include:

- Blanket bog, upland heathland, purple moor grass and rush pastures, good quality semi-improved grassland, and upland flushes fens and swamps in the South Pennine Moors (**15**)
- Lowland heathland and deciduous woodland in the Cannock Chase (**16**)
- Upland heathland to the west of Church Stretton (**17**) and northwest of Cleobury Mortimer (**18**)
- Deciduous woodland to the west of Bewdley (**19**)

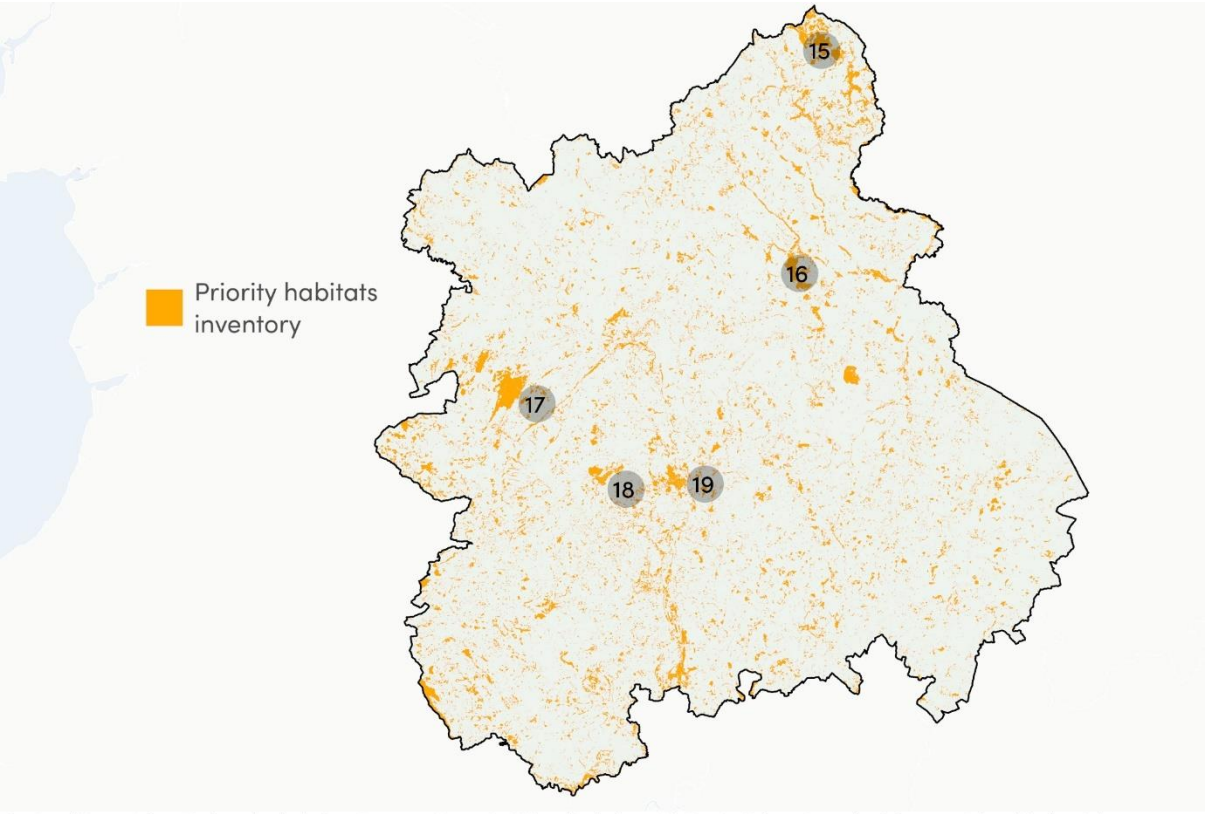

Figure 13.5: Cover of priority habitats in Zone T9

Overall, the area covered by **SAC** designations (including possible SACs) is 6,303 ha (0.5% of the zone); the area covered by **SPA** designations (including potential SPAs) is 2,881 ha (0.22% of the zone); and the area covered by **Ramsar site** designations (including proposed Ramsar sites) is 990 ha (0.08% of the zone). Internationally designated sites for biodiversity, as shown in Figure 13.5 overleaf, include:

- Cannock Chase SAC (**20**)
- South Pennine Moors SAC and SPA (**21**)

The area covered by **SSSI** designations is **27,049 ha** (2% of the zone). Nationally designated sites for biodiversity, as shown in Figure 13.5 overleaf, include:

- Low Mynd SSSI (**22**)
- Wyre Forest SSSI and NNR (**23**)

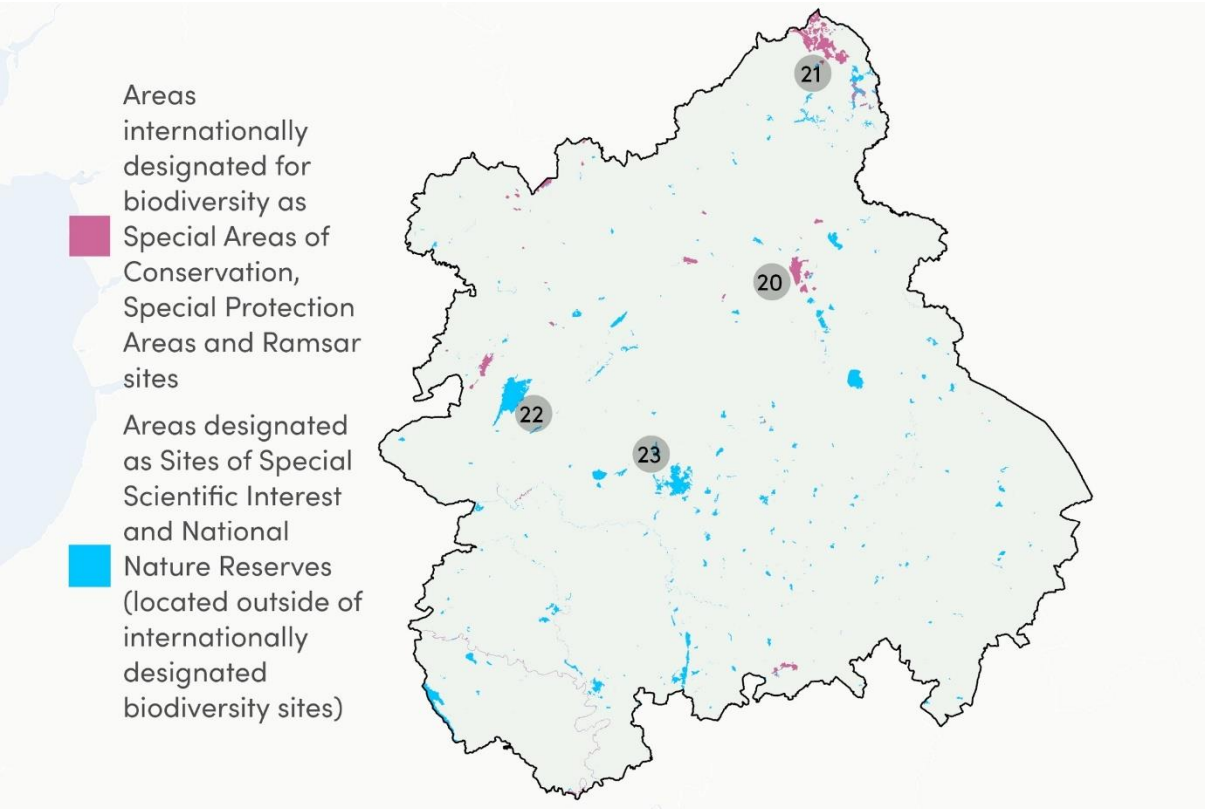

Figure 13.6: Internationally and nationally designated sites for biodiversity in Zone T9

The percentage of the zone covered by **ancient woodland** is 3%, totalling 39,836 ha.

13.7. Land and soil resources

As shown in Figure 13.7 overleaf, the varied geology and topography across Zone T9 is reflected in the diversity of agricultural land quality in the zone. Land in Herefordshire and surrounding the River Wye (**24**) comprises land classified as the **BMV**, with further areas of higher-grade agricultural land located along the valleys of the **River Avon** (**25**) and **River Severn** (**26**), the Wyre Forest, Shropshire and around Lichfield and Tamworth.

The presence of the Birmingham-Black Country conurbation (**27**), alongside other built-up areas mean that 9% of the zone is classified as **urban**. Areas of higher elevations found across the zone offer **lower quality** agricultural land, including around the Peak District (**28**) and around the Shropshire Hills (**29**).

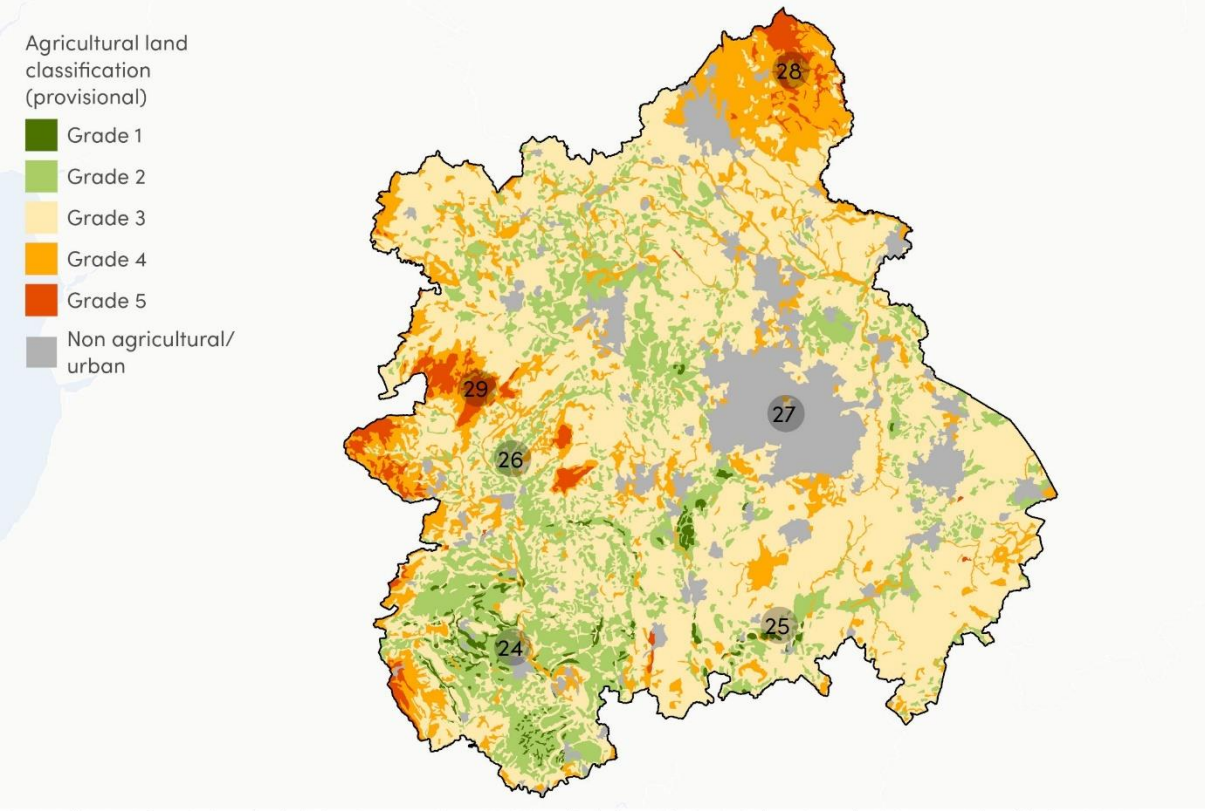

Figure 13.7: Agricultural land classification across Zone T9

13.8. Landscape and seascape

Zone T9 has a diverse range of landscapes, representing a significant breadth of landscape types which reflect the interplay of area's topography, geology, biodiversity, land uses and cultural heritage.

To the west of Zone T9, the landscape is defined by **rolling hills**, extensive **woodlands**, and a network of **rivers**, including the **Severn**. These provide a deeply rural character in Shropshire. Further east, landscape character is defined by **heathland**, **meadows**, and **farmland**, the river valley of the **Trent** in Staffordshire and Cannock Chase.

The Shropshire and Staffordshire landscape transitions into the **industrial heartlands** of the Black Country and Birmingham, where heavy industries such as coal mining, metalworking, and manufacturing have historically shaped the area's industrial landscape.

Warwickshire's landscape is defined by the **Cotswold Hills** in the south, the **Avon Valley** in the west, the lowland agricultural region of the Feldon and the Arden, a region of **wood pasture** and **heath**.

To the south in Herefordshire, Zone T9's landscape is characterised by the valley of the **River Wye**, **limestone escarpments**, picturesque **villages**, and expansive **agricultural land**, which has shaped the area's deeply rural character.

Part of the Zone T9 (11.4%) is covered by National Park or National Landscape status: the percent of the zone covered by National Parks is 1.6% (20,635 ha); and the percent covered by National Landscapes is 9.8% (127,830 ha).

The southern tip of **Peak District National Park** is located in Zone T9 (see Figure 13.8 below). Its special qualities include dramatic rock edges and wild moorlands; tranquil dales; ancient woodlands; a diverse landscape shaped by human activity, featuring hills, valleys, and limestone caves; timelessness; tranquillity; an extensive network of public rights of way; traditional farming practices; clean water; significant historical sites; and a wealth of historic buildings, structures, and landscapes.

Five National Landscapes are located wholly or partly within Zone T9 (see Figure 13.8 below). These range from the upland landscapes of the **Shropshire Hills**, with their steep, rounded hills, open moorland, and notable areas such as the Long Mynd, Wenlock Edge, and The Wrekin, to the mixed countryside of **Cannock Chase**, featuring heathlands, woodlands, and notable areas such as Brocton Coppice and Sherbrook Valley. Additionally, the **Malvern Hills** offer ancient hills, scenic views, and notable areas such as the Worcestershire Beacon and British Camp, whilst the **Wye Valley** features limestone gorges, dense woodlands, and notable areas such as Symonds Yat and Tintern Abbey. **The Cotswolds**, with their rolling hills, limestone grasslands, and notable areas such as Broadway Tower and Bourton-on-the-Water, provide a diverse range of natural beauty and habitats.

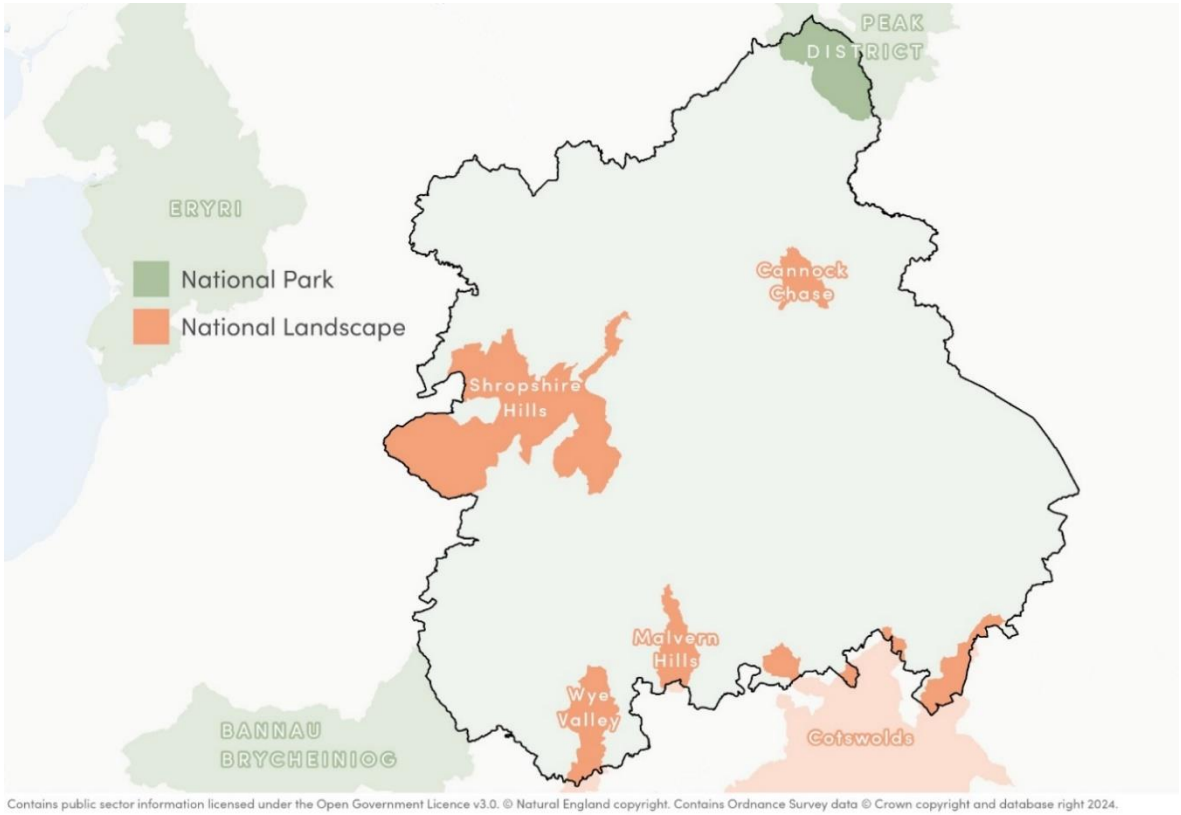

Figure 13.8: Designated landscapes within Zone T9

13.9. Water

According to the WFD river classification data (2019), **18 waterbodies** in Zone T9 are classified as having a **'bad' ecological status**. These are:

- Bodenham Bk – source to conf R Lugg
- Bourne-Bilson Brook Catchment (trib of Trent)
- Bourne – source to R Tame
- Burlington Bk – source to conf Neachley Bk
- Churnet from Meerbrook to Leekbrook
- Moreton Bk – source to conf R Lugg
- Pyford Brook Catchment (trib of Trent)
- Rea Bk – conf Pontesford Bk to conf R Severn
- Rea – conf Farlow Bk to conf R Teme
- Red Strine – source to conf R Strine
- Scotch Brook Catchment (trib of Trent)
- Sneyd Brook from Source to Tame (W/hampton Arm)
- Suckley Bk – source to conf Leigh Bk
- Tach Bk – source to conf R Avon
- Trent from Source to Ford Green Brook
- Tedstone Bk – source to conf R Frome
- Tern – conf R Meese to conf R Roden
- Tributary – source to conf R Roden

The River Basin District Flood Risk Management Plans that cover Zone T9, and the **FRAs** which falls within the zone, are set out below:

- The **Humber** River Basin District Flood Risk Management Plan 2021 to 2027[128] identifies 38 FRAs for significant risk of flooding from **main rivers and the sea**; **three FRAs** are in this zone: Fazeley and Selly Park, Sparkhill. It also identifies **12 FRAs** as being at significant risk of flooding from **surface water**, one of which is in this zone: Birmingham.
- The **Severn** River Basin District Flood Risk Management Plan 2017 to 2021[129] identifies five FRAs for significant risk of flooding from **main rivers and the sea**; **one FRA** is in this zone: Henley-in-Arden. It also identifies **five FRAs** as being at significant risk of flooding from **surface water**, three of which are in this zone: Coventry, Redditch, and Wolverhampton.
- The **Dee River** Basin District Flood Risk Management Plan 2021 to 2027[130] highlights that there are no FRAs within the English portion of the Dee River Basin District.

As highlighted in the Humber and Severn River Basin District River Basin Management Plans, particular challenges facing the water environment include: climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry

[128] UK Government (2016): Humber River Basin District Flood Risk Management Plan
[129] UK Government (2016): Severn River Basin District Flood Risk Management Plan
[130] UK Government (2016): Dee River Basin District Flood Risk Management Plan

waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

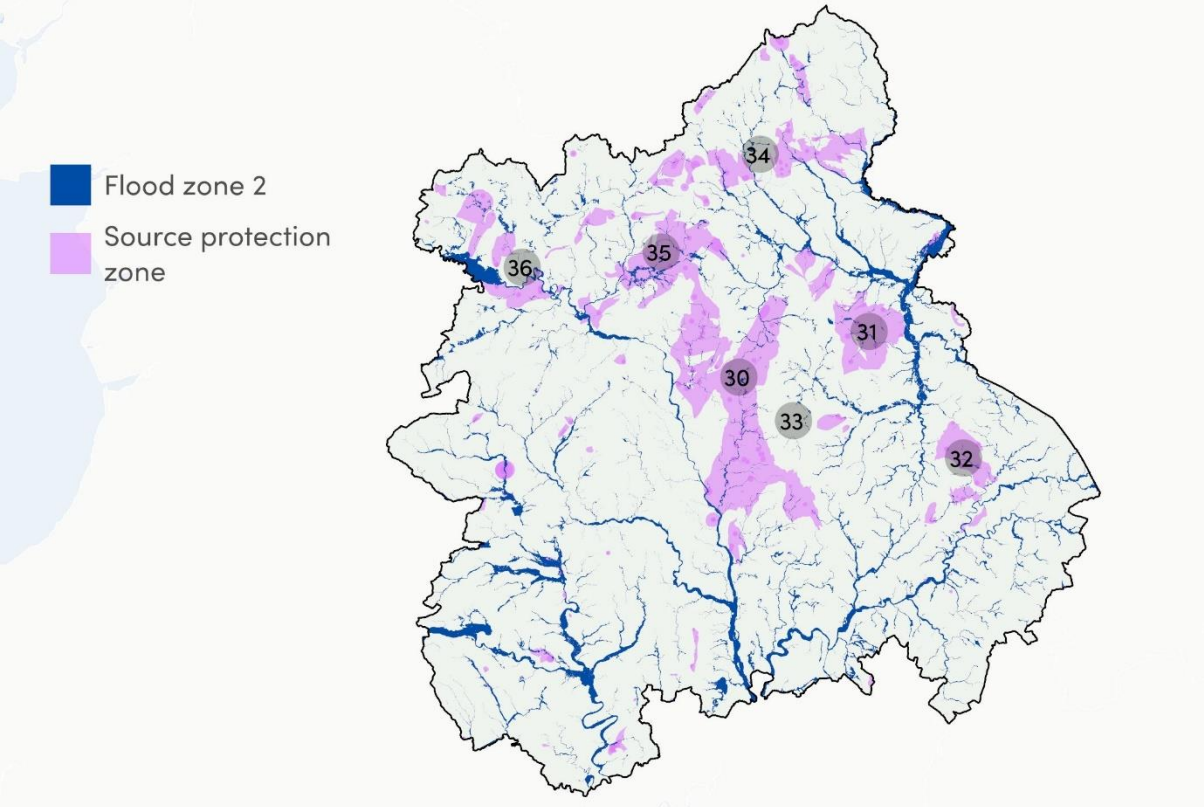

Figure 13.9: Areas of Flood Zone 2 and SPZs and NVZs within Zone T9

As shown in Figure 13.9 above, **SPZs** are mostly present in the vicinity of the Wolverhampton (**30**), Lichfield (**31**), Coventry (**32**), Birmingham (**33**), Stoke on Trent (**34**), Newport (**35**), and Shrewsbury (**36**).

13.10.Key issues for Zone T9

The following key issues have been identified through the review of the baseline information for Zone T9:

- **Air quality** issues affect a significant proportion of the urban areas of the zone.
- Woodland and trees in the West Midlands form an important **carbon sink**.
- In terms of its age profile, of the nine English regions, the West Midlands has the highest percentage of people **aged 15 and under**.
- The zone includes some of the **most deprived** communities in England, including in Birmingham, Dudley, Sandwell and Wolverhampton. Other particular pockets of deprivation are in Coventry, Stoke on Trent, Burton on Trent, Nuneaton, Tamworth and Redditch.
- The zone has a rich and diverse **heritage resource**. Industrial heritage (including the canal network) in the West Midlands remains a key opportunity for heritage led regeneration across the region.

- There are significant areas of the **best and most versatile** agricultural land in the zone, including in Herefordshire, along the valleys of the River Avon and River Severn, Wyre Forest, Shropshire and around Lichfield and Tamworth.
- Five **National Landscapes** are located wholly or partly within Zone T9.
- **18 waterbodies** in Zone T9 are classified as having a **'bad' ecological status**.
- Many parts of the zone are at significant risk of fluvial **flooding**, with numerous significant flooding events taking place since 2015. This includes associated with the catchments of the River Severn, River Wye, River Avon and River Trent.
- Particular challenges facing the **water environment** include climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

14. Zone T10: East of England

Overview of Zone T10

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for T10

14.1. Overview of Zone T10

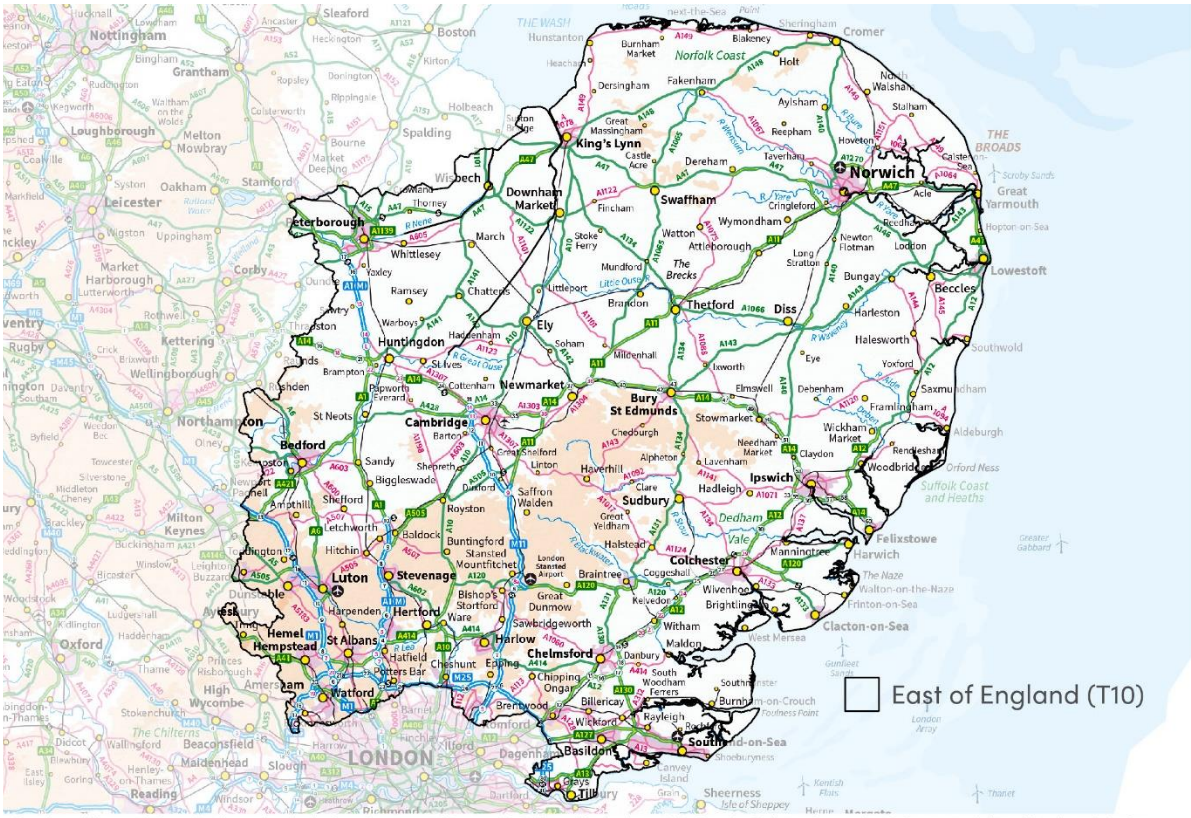

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Figure 14.1: Area covered by Zone T10 – East of England

Zone T10 comprises the East of England region.

Zone T10 (see Figure 14.1 above) covers an area of **19,136 km²** and has a population of **6.3 million** people. The zone includes a number of key urban areas, including Cambridge, Norwich, Ipswich, Colchester, Chelmsford, Luton and Peterborough. Approximately 7-8% of the zone is considered to be built-up.

The rural areas of the East of England have a strong agricultural presence, with extensive areas of fertile agricultural land extending across the zone. Reflecting this, there are numerous significant market towns serving their rural hinterlands.

The East of England's coastline on the North Sea covers the coastline of Essex, Suffolk and Norfolk. There are a number of important ports in the zone, including Tilbury, Felixstowe and Harwich, as well as centres of the fishing industry such as Lowestoft.

The East of England has a number of distinctive landscapes, including fenland, broads, heathland, dunescapes, plateau farmland and valleys, and chalklands, as well as a range

of seascapes including marshlands, estuaries, dunes and cliffs. There is one National Park and four National Landscapes within (or overlapping with) the zone and some significant areas designated for their habitats and wildlife, especially along the coastal areas and estuaries.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

14.2. Air quality

Air quality issues in the zone are largely associated with traffic and transport. As highlighted by the location of the **74 AQMAs** in the zone, air quality issues are distributed across the settlements zone. There is a concentration of AQMAs in the southern part of the zone, which is linked to the density of settlements in this area and its proximity to London.

AQMAs within this zone are primarily designated for exceedances in the annual mean concentration objective of 40µg/m^3 for NO_2, though AQMAs within the local authorities of **Peterborough** (**1**) and **Fenland** (**2**) (see Figure 14.2 overleaf) are also designated for exceedances in the 15-minute average for SO_2, which is 266µg/m^3. SO_2 is associated with both natural and human-induced activities – especially energy production and industrial activity[131] - and in these locations is linked to industrial activity along the River Nene in Wisbech[132], and the Whittlesey Brickworks.[133] Additionally, a number of AQMAs are designated for exceedances in the 24 hour mean concentration objective of 50µg/m^3 for PM_{10}; these are largely within proximity to London and are associated with natural sources and human-induced sources such as smoke from fires, industrial emissions and dust from traffic.

[131] UK Government (2024): Emissions of air pollutants in the UK – Sulphur dioxide (SO2)
[132] Peterborough City Council (2024): 2024 Air Quality Annual Status Report (ASR)
[133] Fenland District Council (2024): 2024 Air Quality Annual Status Report (ASR)

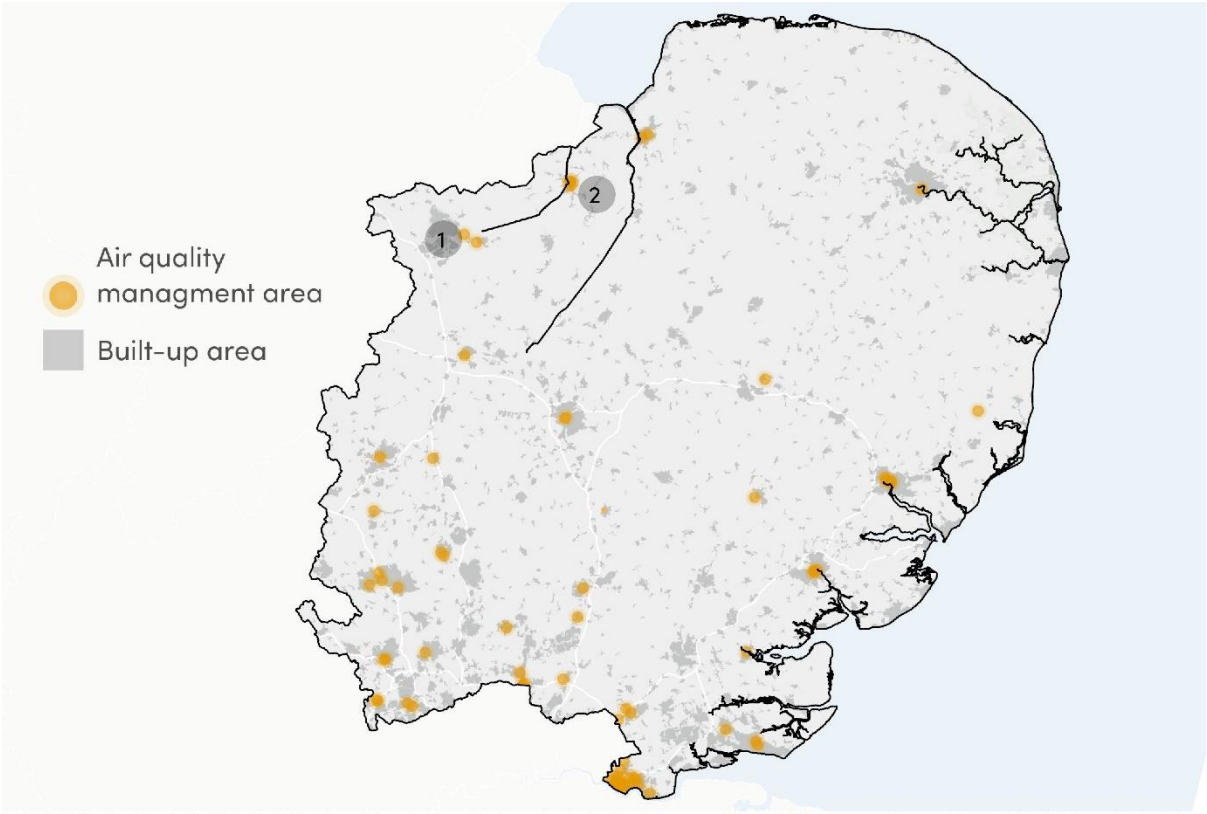


Figure 14.2: AQMAs in Zone T10

14.3. Climate change

Total greenhouse gas emissions in the East of England totalled **36,050.1 kt CO_2e** in 2022. The largest contributor to greenhouse gas emissions in 2022 was the **transport sector** (approx. 34.5% of emissions), followed by the domestic sector (approx. 22.1%) and the agricultural sector (approx. 10.9%)[134].

There is an extensive area of peatland associated with the Bedford Levels in this zone. This, alongside the woodland coverage in this zone (ancient woodland, deciduous woodland and traditional orchards), provide a level of **carbon storage**.

Primary impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections (UKCP18)[135], winters in this zone are anticipated to be 1.3°C warmer between 2021-2040 and 3.11°C warmer between 2061-2080 in comparison to 1981-2000 (4.23°C). Warmer summers are also anticipated - with a 2.26°C increase anticipated for 2021-2040, and a 5.08°C increase for 2061-2080 in comparison to 1981-2000 (15.8°C). Winters in this zone are anticipated to be wetter (increasing to 2.89mm/day in 2061-2080

[134] UK Government (2022): UK local authority and regional greenhouse gas emissions statistics
[135] Met Office (no date): UKCP data

in comparison to 2.47mm/day in 1981-2000), and drier in the summer (decreasing to 1.34mm/day in 2061-2080 in comparison to 1.95mm/day in 1981-2000).[136]

Secondary impacts from climate change are largely linked to changes in temperature, humidity and precipitation. These can be widespread and impact upon ecosystems, people, settlements and infrastructure. Changes in precipitation patterns can lead to an increase in flood events or the occurrence of drought, which can impact on agriculture and natural resources. Increased temperatures can also result in heat-related human mortality, and cause species loss. Additionally, higher temperatures and the occurrence of heatwaves can aggravate air pollution events and also limit the function of key infrastructure – including compromising energy systems. The Intergovernmental Panel on Climate Change (IPCC) outlines that the energy sector is climate-exposed, indicating that energy infrastructure will become increasingly vulnerable if design standards do not account for changing climate conditions[137]. Infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems are viewed as the most feasible adaptation techniques – alongside energy generation diversification (i.e., a greater use of renewable energy)[138].

14.4. Community wellbeing

The population of Zone T10 is **6,335,074** (ONS Census 2021). It has a population density of 331.4 residents per km^2, with density variations throughout the zone.

In terms of its age profile, Zone T10 has a lower working age population (61.6%) compared to the English average of 63% (see Figure 14.3 below). The East of England also has a higher proportion of people of **retirement age** and above than the English average, at 19.6% (Census 2021).

[136] Based on the RCP8.5 emissions scenario, which assumes there is fast population growth, low technical development rate, slow GDP growth, a massive increase in world poverty and high energy use and emissions. It also assumes no climate change mitigation or adaptation techniques are engaged with.
[137] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[138] IPCC (2019): Climate Change and Land

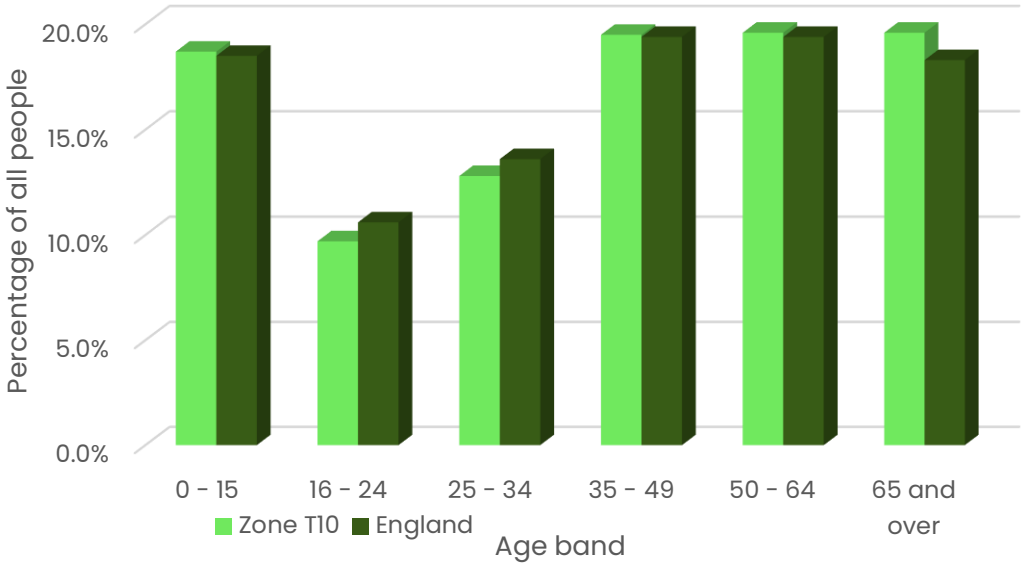


Figure 14.3: Age profile of Zone T10 (source ONS Census 2021)

IMD data from 2019 shows that particular **pockets of deprivation** are found throughout the zone including in Peterborough, Ipswich, Luton, Norwich, King's Lynn, Bedford and Basildon. The zone also includes coastal towns and areas with high levels of deprivation, including Southend-on-Sea, Clacton-on-Sea, Great Yarmouth and Lowestoft. Areas with lower levels of deprivation include Cambridge, Brentwood, Chelmsford and towns such as St Albans to the north of London. Most inland villages and small towns throughout the zone also have lower levels of deprivation.

Key 'traditional' economic sectors in the zone include agriculture, fishing and education and research. The popularity of parts of the region as a holiday destination (including the coast) also means tourism makes a significant seasonal contribution to the local economy. Other sectors include energy generation and a growing IT technology and digital sector; this includes associated with the offshore wind resource in the North Sea. Lowestoft is also a significant fishing port.

In Zone T10, the industries with the **highest regional GVA in 2022**[139] were the services sector and real estate activities.

The region has an excellent **rights of way network**. There are two National Trails located in the zone, the 149 km Peddars Way and Norfolk Coast Path and a small section of The Ridgeway National Trail to the south west. The Peddars Way and Norfolk Coast Path runs from the Knettishall Heath Country Park to Cromer Pier, whilst passing through the North Norfolk Heritage Coast.

14.5. Cultural heritage and historic environment

The East of England has a rich and diverse **historic environment**, as shown by Figure 14.4 overleaf. East Anglia was one of the main centres of the medieval wool trade. The wool trade became the backbone and driving force of the Medieval English economy between

[139] ONS (2024): Regional gross value added (balanced) by industry: all ITL regions

the late thirteenth century and late fifteenth century, and this is demonstrated by the historic environment of many settlements in the area. Particular clusters of heritage assets from this era include in the villages along the **Stour Valley** (**3**), and the Wool Towns of Suffolk and north Essex. Norfolk was also a centre of the wool trade, and **Norwich** (**4**) in particular owes its wealth to the trade, with the city being the second largest in England from medieval times to the 18th Century. There are particular concentrations of heritage assets in these locations.

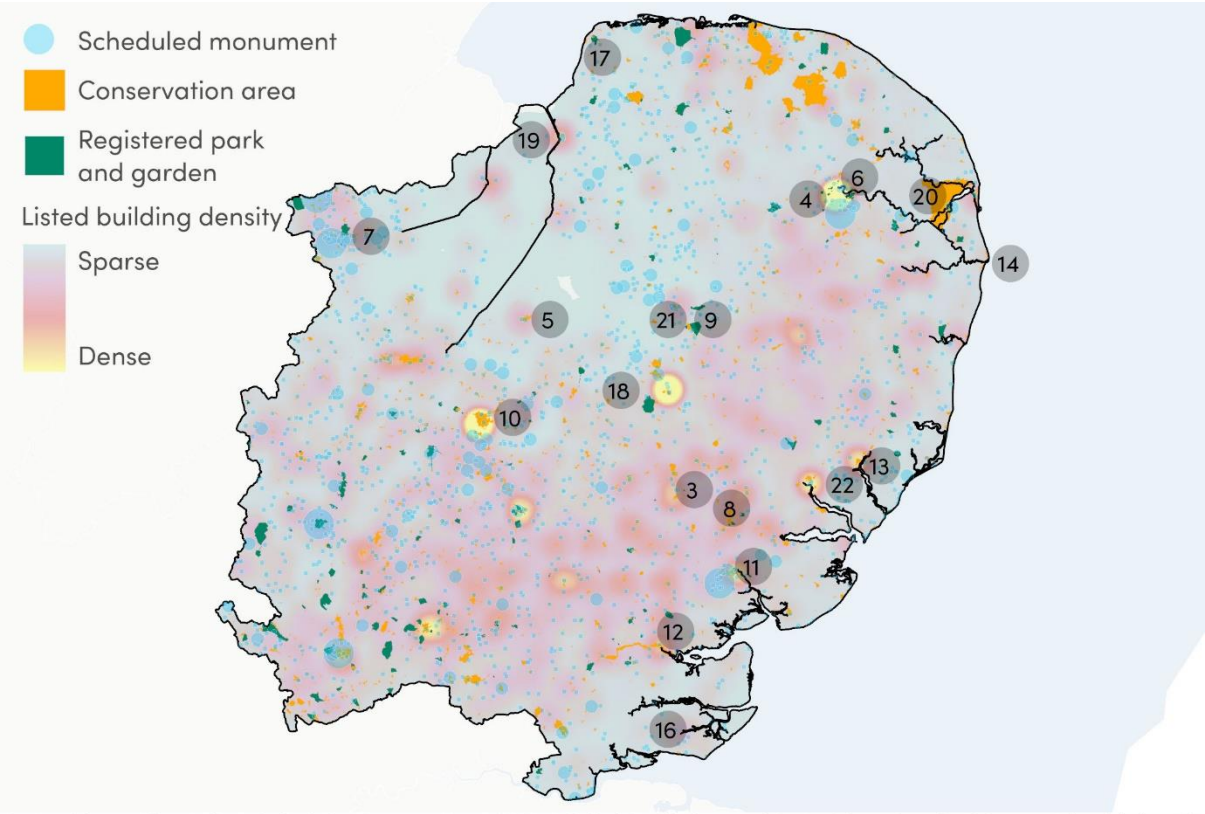


Figure 14.4: Designated heritage assets within Zone T10

The region is rich in ecclesiastical heritage, with a number of prominent cathedrals present including **Ely Cathedral** (**5**), **Norwich Cathedral** (**6**) and **Peterborough Cathedral** (**7**). There are also many significant churches in the region, which are signs of the wealth from the wool trade, with examples being those of Lavenham (**8**), Long Melford, Sudbury, Clare, Braintree and Halstead. The ecclesiastical heritage of the zone is also reflected by the presence of a number of priories, including **Thetford Priory** (**9**) and **Castle Acre Priory** (**10**) in Norfolk.

The heritage resource of other settlements in Zone T10 reflect a wider diversity of historic environment resources. These include, but are not limited to, the university town of Cambridge (**10**); the Roman towns of Colchester (**11**) and St Albans; the maritime history of settlements such as Harwich, Maldon (**12**), Ipswich, Woodbridge (**13**) and Lowestoft (**14**); and the seaside heritage of settlements including Southend-on-Sea (**15**), Southwold, Aldeburgh (**16**), Great Yarmouth and Hunstanton (**17**). There is also a significant historic environment resource associated with WWII, including linked to the presence of Royal Air Force and United States Army Air Force **airbases** (**18**).

The area also has distinctive historic landscapes. This includes those of the **Fens** (**19**), which were drained in the 17th Century, and the **Norfolk Broads** (**20**), which are flooded peat workings. Given the historic affluence of the zone, registered parks and gardens are distributed across the zone. Larger densities are though present in the parts of the zone located closer to London, and also Norfolk, which is the location of a number of historically prominent agricultural estates.

The zone has a diverse archaeological resource. The East of England has a rich palaeolithic, Mesolithic and Neolithic archaeological resource. Examples some of the earliest Palaeolithic finds near Happisburgh dating from c.950,000 BCE, which are important to understanding of prehistoric Europe; neanderthal sites at Lynford Quarry, Mundford dating from 60,000 years ago; and the Neolithic flint mines of the **Brecks** (**21**) in Norfolk. The importance of the Brecks in Neolithic times is reflected by the densities of scheduled monuments in the area.

The area also has a rich Anglo-Saxon and Danish Viking heritage, including associated with the Kingdom of East Anglia from the 7th century and the Danelaw in the 9th and 10th centuries. These include the well-known sites of the **Sutton Hoo burial site** (**22**), the Rendlesham royal centre and the Prittlewell burial artefacts.

14.6. Ecology and biodiversity

Priority habitats are present across the region and represent a diverse range of habitats and support a wide variety of species. Particularly extensive areas of priority habitat are shown in Figure 14.5 overleaf, and include:

- Lowland dry acid grassland, lowland calcareous grassland, lowland heathland, and deciduous woodland to the north of Thetford (**23**)
- Coastal and floodplain grazing marsh, mudflats, and reedbeds to the west of Great Yarmouth (**24**)
- Lowland heathland, coastal and floodplain-grazing marsh, saline lagoons, and purple moor grass and rush pastures to the northeast of Leiston (**25**)

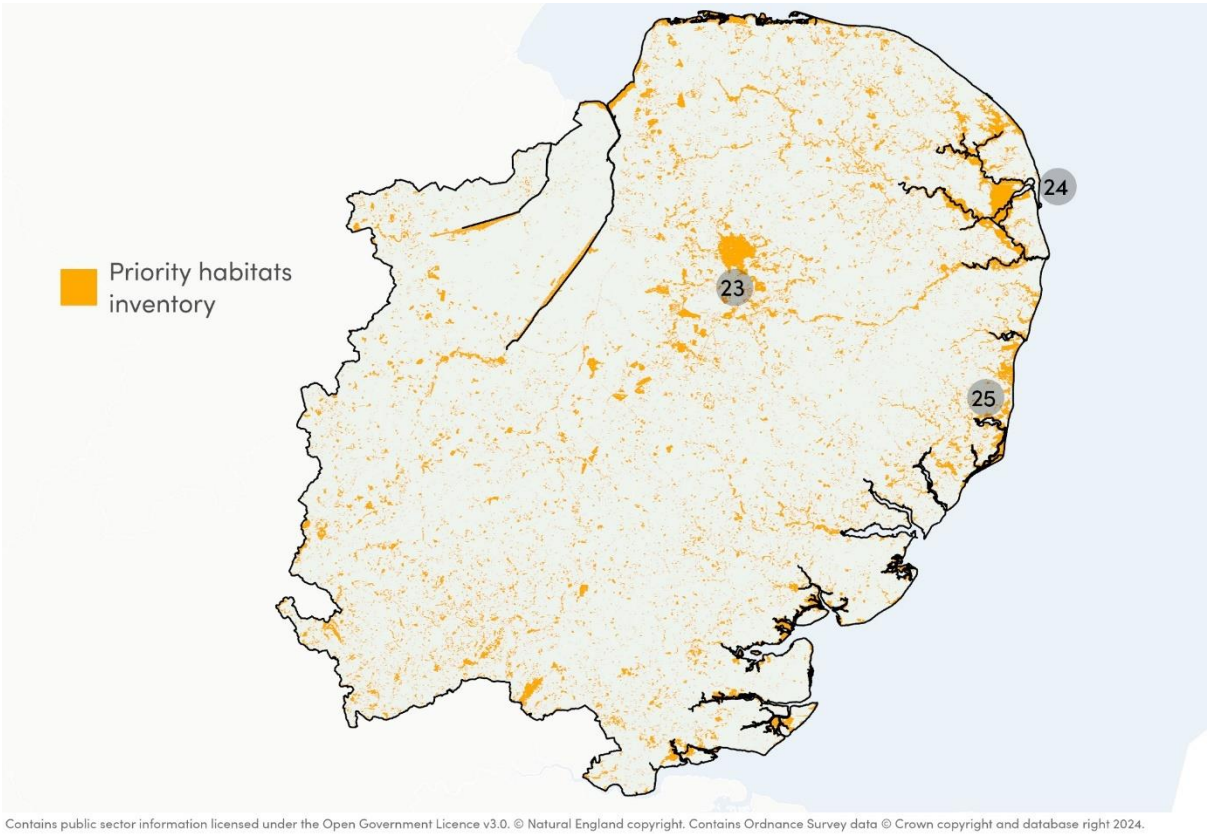


Figure 14.5: Cover of priority habitats in Zone T10

Overall, the area covered by **SAC** designations (including possible SACs) is 30,395 ha (1.6% of the zone); the area covered by **SPA** designations (including potential SPAs) is 72,104 ha (3.77% of the zone); and the area covered by **Ramsar site** designations (including proposed Ramsar sites) is 29,593 ha (1.5% of the zone). Internationally designated sites for biodiversity, as shown in Figure 14.6 overleaf, include:

- Breckland SAC and SPA (**26**)
- Abberton Reservoir SPA and Ramsar site (**27**)
- Sandlings SPA (**28**)

The area covered by **SSSI** designations is 94,066 ha (4.9% of the zone). Nationally designated sites for biodiversity, as shown in Figure 14.6 overleaf, include:

- Abberton Reservoir SSSI (**27**)
- Sandlings Forest SSSI (**28**)
- Grafham Water SSSI (**29**)

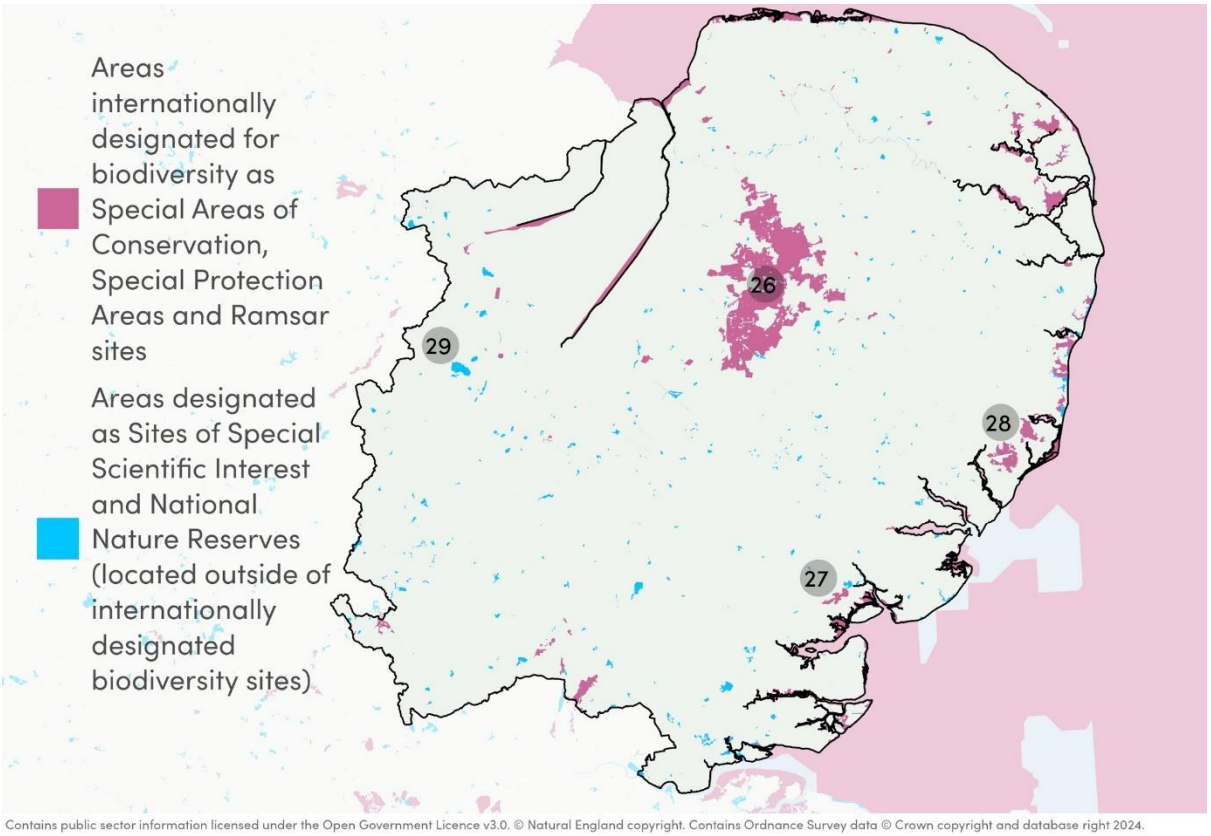


Figure 14.6: Internationally and nationally designated sites for biodiversity in Zone T10

The percentage of the zone covered by **ancient woodland** is 1.4%, totalling 27,449 ha.

14.7. Land and soil resources

As shown in Figure 14.7 overleaf, Zone T10 comprises significant areas covered by the **BMV** agricultural land. 38% of the zone is overlain by **grades 1 and 2** (excellent and very good) agricultural land, and approximately half of the zone is made up of **grade 3** (good to moderate) agricultural land.

The largest concentrations of **grade 1** agricultural land can be found around the North, Middle and South Levels of the Fens, in the area bounded by Peterborough, Thetford, and North of Cambridge (**30**). Another more prominent area of higher-grade agricultural land can be found on low-lying land to the north of **The Broads National Park** (**31**). There are also extensive areas of **grade 2** agricultural land across Essex, Cambridgeshire, east Central Bedfordshire and Bedford (**32**), with a small area of **grade 1** found to the east of Colchester (**33**).

The predominance of rich agricultural land has been a central component of the East of England's culture, heritage and historic evolution.

The cliffs along the zone, including along the north Norfolk coastline, are susceptible to **coastal erosion**, which has the potential to lead to the loss of productive agricultural land

over time. The cliffs provide little resistance to the aggressive action of North Sea waves, which erode the base of the cliffs.[140]

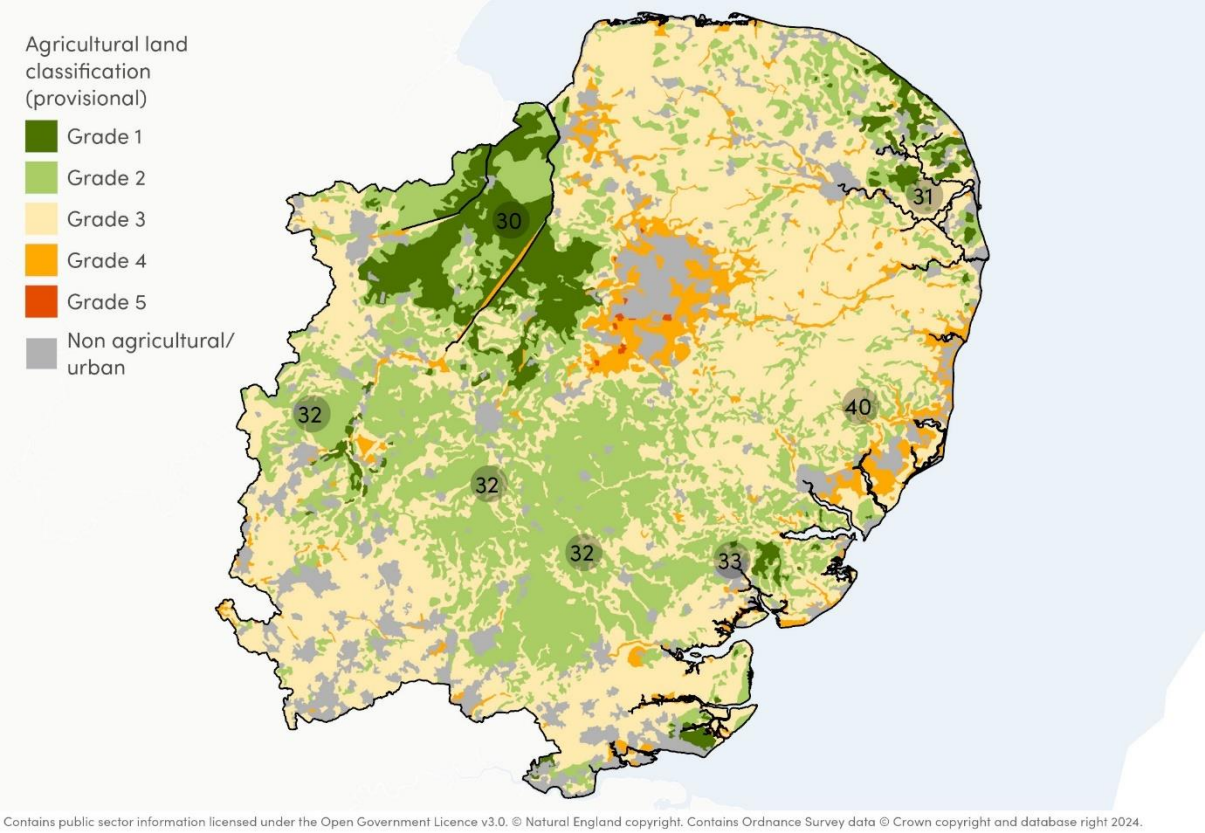


Figure 14.7: Agricultural land classification across Zone T10

14.8. Landscape and seascape

Zone T10's landscape is varied. The **fenland** area of the north west of the zone comprises mostly **reclaimed land** from both freshwater fen and sea marsh. **The Fens** is a large scale, open and expansive low-lying landscape with a very rural character and, agriculturally is hugely productive. Woodland is sparse, covering less than 1% of the total area. The landscape of the Fens is dependent on the interconnected networks of **ditches and dykes** that drain the surrounding farmland into the rivers.

Landscape character elsewhere in the region is diverse and includes: the plateau estate **farmlands** and **saltmarsh**, **intertidal flats** and **dunes** of North Norfolk; the **forested sandy area** of the Brecks; the **marshes** of the Norfolk Broads and surrounding **lowland farmlands** east of Norwich; the **plateau claylands** of south Norfolk and north Suffolk, the **forested estate sandlands** of east Suffolk; the **saltmarsh** and **intertidal flats** of the Wash and the Essex and Suffolk estuaries; the **wooded hills** and **ridges** of north Essex; the **chalk hills**, **scarps** and **valleys** of the Chilterns; and the **limestone village farmlands** of west Cambridgeshire and Bedfordshire.

The region's landscape character is defined in many areas by a strong sense of openness and rurality, which gives rise to long uninterrupted and expansive views over undeveloped

[140] North Norfolk District Council (no date): Find out more about the north Norfolk coast

skylines. To the east, the zone has a diverse coastline, with **sandy beaches**, **salt marshes**, and **cliffs**, alongside **historic seaside towns** such as Southwold and Aldeburgh. The fishing and shipping industries have shaped local landscape and seascape here, with their influence evident in the zone's **port towns** such as Lowestoft, Yarmouth, and Felixstowe. The **River Thames** adjoins the southern part of the zone, shaping the landscape as it moves towards London.

Part of Zone T10 (7.0%) is covered by National Park or National Landscape status: the percent of Zone T10 covered by National Parks is 1.5% (29,124 ha); and the percent covered by National Landscapes is 5.5% (104,773 ha).

The Broads National Park is a lowland National Park located entirely in Zone T10 (see Figure 14.8 overleaf). Its special qualities include extensive waterways; fens; marshes; woodlands; tranquillity; an extensive network of public rights of way; traditional land and water management practices; and many historic buildings and structures.

Four National Landscapes are located wholly or partly within Zone T10 (see Figure 14.8 overleaf). These range from the coastal landscapes of the **Norfolk Coast**, with its sandy beaches, salt marshes, and notable areas such as Holkham, Blakeney, and Cromer, to the diverse habitats of the **Suffolk Coast and Heaths**, featuring ancient woodlands, estuaries, and notable areas such as Aldeburgh, Southwold, and Orford Ness. Additionally, **Dedham Vale** offers picturesque river valleys, rolling farmland, and notable areas such as Flatford and Dedham, while the **Chilterns** feature chalk hills, beech woodlands, and notable areas such as Dunstable Downs, Wendover Woods, and Ashridge Estate.

Heritage coasts have been established to conserve the best stretches of undeveloped coast in England. Reflecting the zone's distinctive seascapes, a small proportion of Zone T10 (0.08%) is covered by heritage coast.

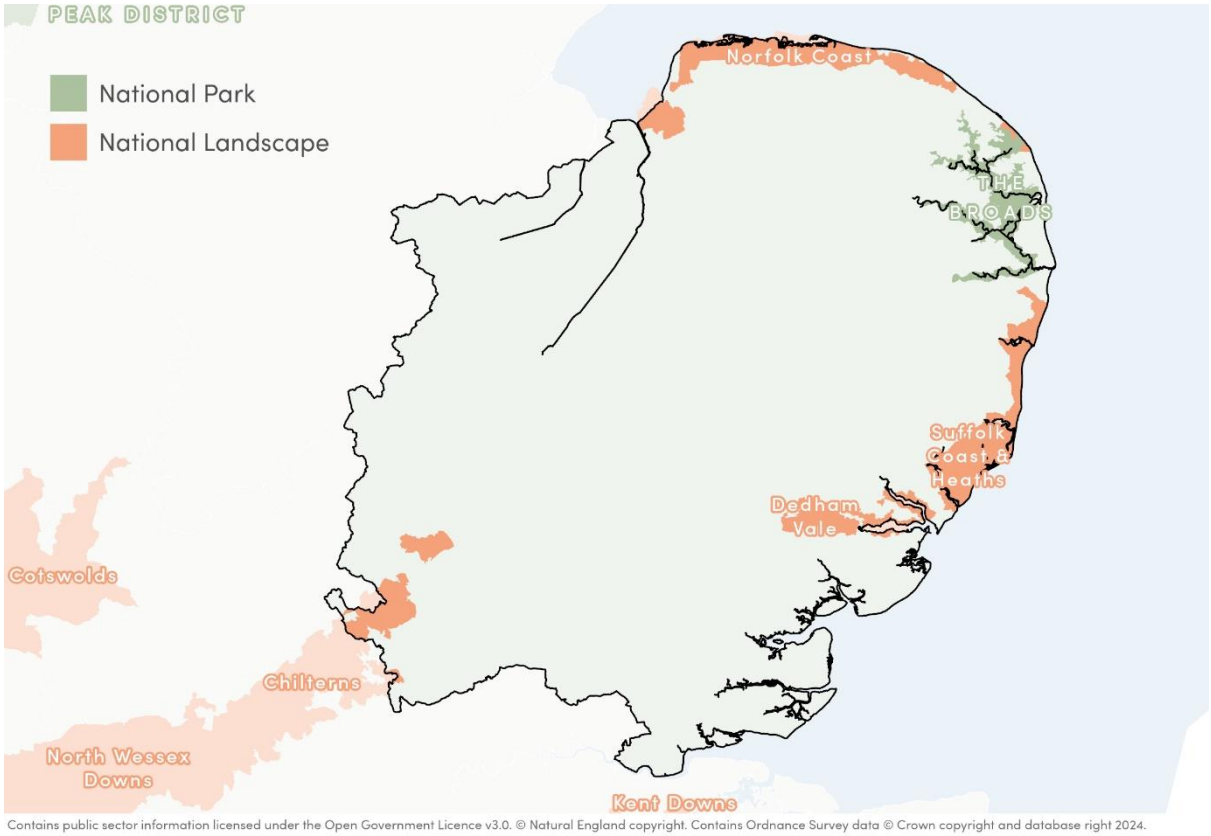


Figure 14.8: Designated landscapes within Zone T10

14.9. Water

According to the WFD river classification data (2019), **eight waterbodies** in Zone T10 are classified as having a **'bad' ecological status**. These are:

- Billing Brook
- Binham Tributary
- Colne (upper east arm including Mimshall Brook)
- Harrowden Brook
- Hawstead Tributary
- Lark (Hawstead to Abbey Gardens)
- Lee (from Luton to Luton Hoo Lakes)
- Little Ouse (US Thelnetham)

The River Basin District Flood Risk Management Plans that cover Zone T10, and the **FRAs** which falls within the zone, are set out below:

- The **Anglian** River Basin District Flood Risk Management Plan 2021 to 2027 identifies 16 FRAs for significant risk of flooding from **main rivers and the sea**; **nine FRAs** are in this zone: Alconbury, Alconbury Weston, Great Yarmouth, Hunstanton, King's Lynn, Lowestoft, Oakington, Saffron Walden, and Wisbech. It also identifies 12 FRAs as being at significant risk of flooding from **surface water**; **eight FRAs** are in this zone: Cambridge, Chelmsford, Colchester, Huntingdon, Ipswich, March, Norwich, and South

Essex. In addition, the plan identifies eight FRAs at risk of **tidal flooding**; **four FRAs** are in this zone: Great Yarmouth, Hunstanton, King's Lynn, and Wisbech.

As highlighted in the Anglian River Basin District River Basin Management Plan[141], particular **challenges facing the water environment** include: climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

Water scarcity is a significant problem in the East of England, which is classified as severely water stressed.[142] Despite this, demand for water is growing with one of the highest rates of new housing development in the country.

Water Resources East's Regional Water Resources Plan for Eastern England[143] highlights that the region faces projected **water shortages** of 800 million litres of water per day by 2050, equal to a third of current regional water use. This water deficit is being driven by an urgent need to take far less water from over-abstracted rivers and groundwater sources, high levels of population and economic growth, and the changing climate.

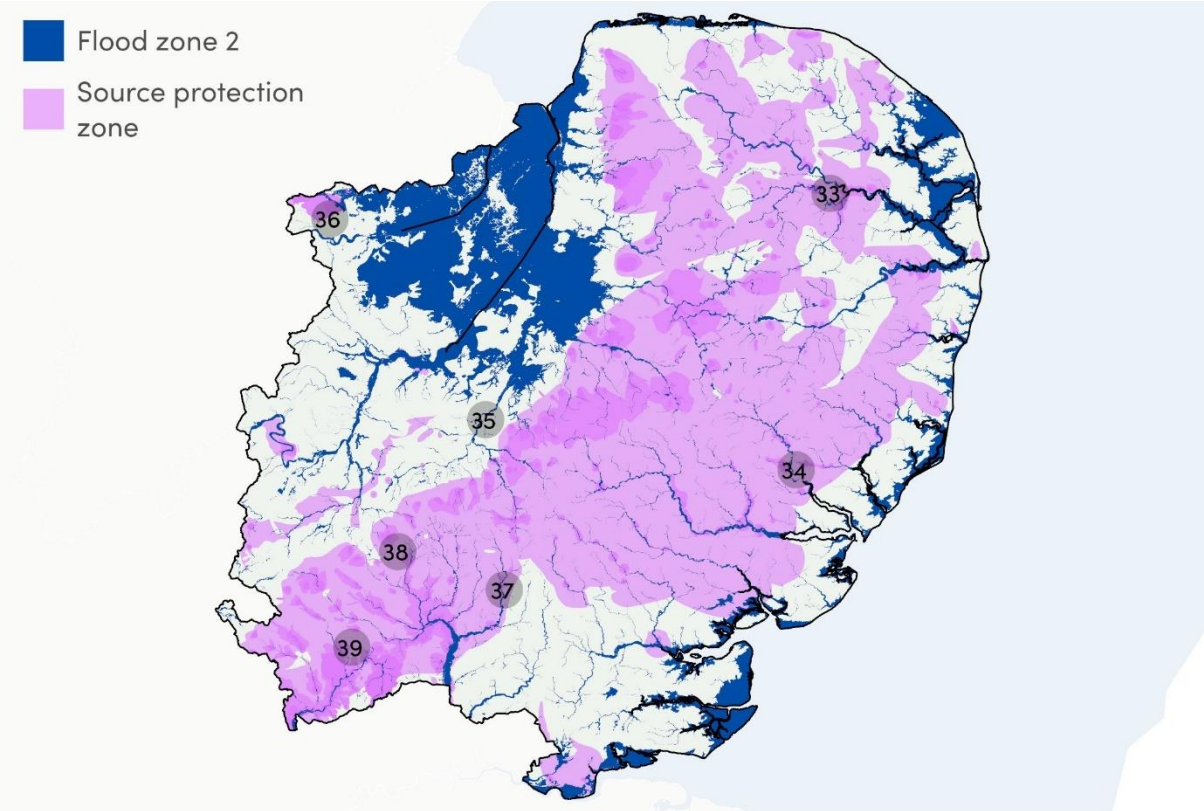


Figure 14.9: Areas of Flood Zone 2 and SPZs and NVZs within Zone T10

[141] UK Government (2022): Anglian River Basin District River Basin Management Plan
[142] Water Resources East (no date): WRE's region
[143] Water Resources East (2023): Regional Water Resources Plan for Eastern England

As shown in Figure 14.9 above, **SPZs** cover a large proportion of this zone, including in the area bounded by Norwich (**33**), Colchester (**34**), and Cambridge (**35**), and in the vicinity of Peterborough (**36**), Bishop's Stortford (**37**), Stevenage (**38**), and St Albans (**39**).

14.10.Key issues for Zone T10

The following key issues have been identified through the review of the baseline information for Zone T10:

- The East of England comprises significant areas covered by the **best and most versatile** agricultural land. The predominance of rich agricultural land has historically been a central component of the East of England's culture, heritage and economy.
- Particular **pockets of deprivation** are found in Peterborough, Ipswich, Luton, Norwich, King's Lynn, Bedford and Basildon. The zone also includes coastal towns and areas with high levels of deprivation, including Southend-on-Sea, Clacton-on-Sea, Great Yarmouth and Lowestoft.
- The East of England is well placed for the economic opportunities associated **offshore wind energy** provision in the North Sea.
- The area has a diverse range of landscapes and seascapes and includes the **Broads National Park** and four **National Landscapes**. Much of the Suffolk and Norfolk coast is covered by National Landscape designations.
- A significant proportion of the East of England's coastline is designated for its **biodiversity** value, including the Wash, the Essex and Suffolk estuaries and the North Norfolk coastline.
- The East of England has a rich and diverse **historic environment**, spanning a range of eras from palaeolithic, Mesolithic and Neolithic ears to the 20th century. The region is particularly rich in heritage assets associated directly or indirectly with the **wool trade** and has a number of important historic landscapes.
- The zone has a rich prehistoric and early medieval **archaeological heritage**.
- **Eight waterbodies** in Zone T10 are classified as having a **'bad' ecological status**.
- **Water scarcity** is a significant issue in the East of England given the zone is the driest part of the UK, and the significant housing and employment growth recently seen in the region. This has significantly affected groundwater and surface water resources (including through over-abstraction); this is likely to increase as an issue with the anticipated growth likely to be seen in the region in forthcoming years and the impacts of climate change become more apparent.

15. Zone T11: South East England

Overview of Zone T11

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for T11

15.1. Overview of Zone T11

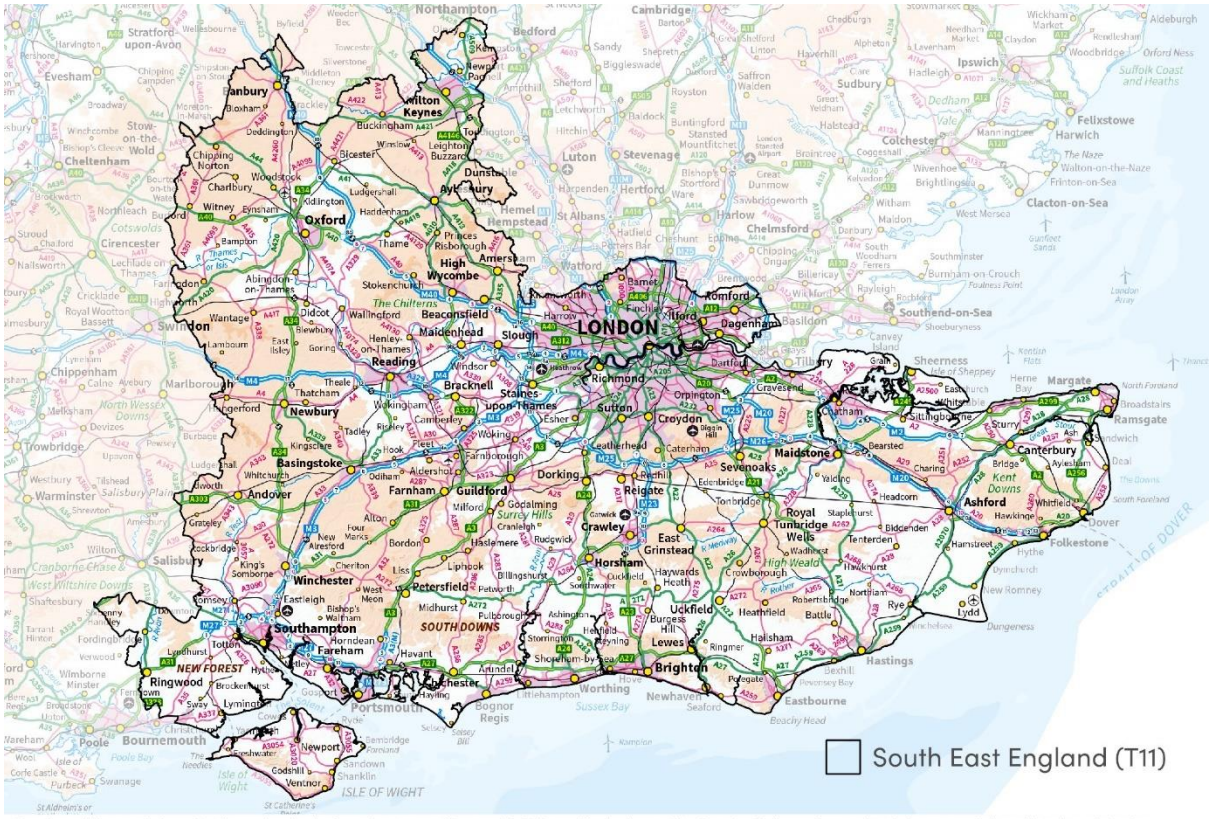


Figure 15.1: Area covered by Zone T11 – South East England

Zone T11 comprises the South East region of England and Greater London.

This zone (as shown in Figure 15.1 above) encompasses the South East of England and Greater London, with a combined population of **18 million**. The zone is the most densely populated region of GB. The zone covers an area of **20,662km²** and incorporates a coastline on the Solent, the Isle of Wight, the eastern English Channel and the Thames Estuary.

The zone contains the United Kingdom's capital city of London, as well as other major urban areas, including Southampton, Portsmouth, Brighton, Basingstoke, Oxford, Reading, Maidstone, Ashford, Dover and Margate/Ramsgate. Many parts of the zone are heavily urbanised: approximately 60% of Greater London is built-up; outside of London the wider South East region is approximately 12% urbanised. The zone has the strongest economy in

GB, and can be categorised as being advanced, high-income, highly skilled, broadly-based and service-oriented.

The zone has significant strategic transport connectivity, and includes the Port of Southampton, the Port of London and the Port of Dover. Further strategic transport connectivity is found through the road and rail network (and its focus on London), as well as key international airport hubs at Heathrow and Gatwick.

The zone contains a number of sensitive and high-quality landscapes, including two National Parks and nine National Landscapes. Key landscape features which define some of the protected landscapes include chalk hills, heathland, historic settlements, coastal cliffs, estuary features, rural and agricultural landscapes and large urban conurbations. Many of the more sensitive landscapes and other areas are internationally and nationally designated for their biodiversity value.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

15.2. Air quality

Air quality issues in the zone are largely associated with traffic and transport. As highlighted by the location of the **166 AQMAs** in the zone, many of the designated areas are within and adjacent to London, with the rest being largely located within larger urban centres – including Reading, Oxford, Brighton and Portsmouth (see Figure 15.2 overleaf). These are primarily designated for exceedances in the annual mean concentration objective of 40µg/m^3 for NO_2, though some AQMAs within and in proximity to London are also designated for exceedances in the hour mean concentration objective of 200µg/m^3 for NO_2. The AQMA in **Surrey Heath** (**1**), and one within **Sittingbourne** (**2**) are also designated for exceedances in the 24 hour mean concentration of 50µg/m^3 for PM_{10}. In Surrey Heath, this is likely linked to the amount of traffic on the local road network (leading to greater levels of emissions and dust linked to vehicular movements)[144], and in Sittingbourne linked to the traffic moving through the urban centre of the settlement[145]. A number of the AQMAs within and adjacent to London also monitor for this pollutant, though some are for both annual (40µg/m^3 for PM_{10}) and 24 hour mean concentrations.

[144] Surrey Heath Borough Council (2023): 2023 Air Quality Annual Status Report (ASR)
[145] Swale Borough Council (2024): 2024 Air Quality Annual Status Report (ASR)

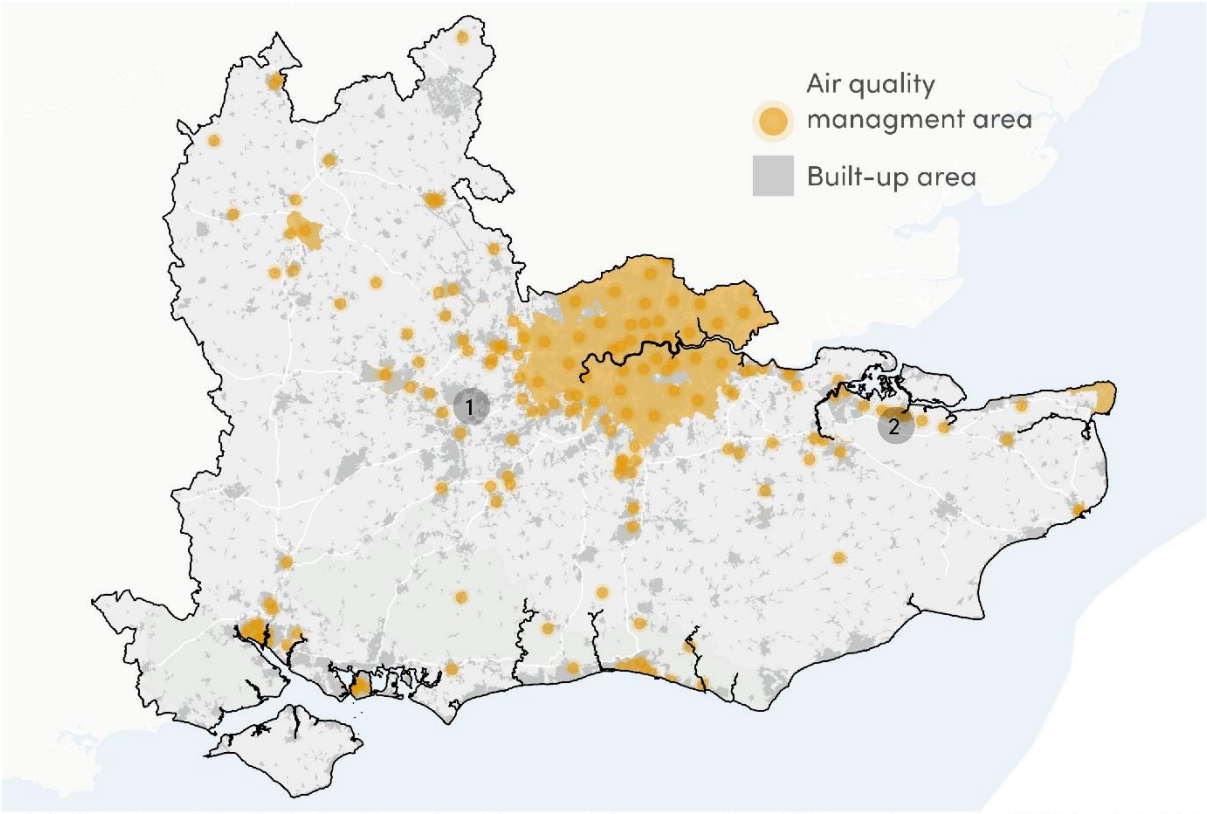


Figure 15.2: AQMAs in Zone T11

15.3. Climate change

In the South East, total GHG emissions came to **41,418.8 kt CO_2e** in 2022. Of this, the **transport sector** is responsible for approx. 40.2% of emissions; the domestic sector is responsible for approx. 28.4%, and the commercial sector for approx. 10.8%[146].

This zone does have carbon storage potential. In 2022, the **land use, land use change and forestry sector** captured and stored 1,596.8 kt CO_2e in the zone[147], which helped to reduce overall emissions. Whilst there is peatland around Reading, Basingstoke and Bournemouth, woodland coverage of this zone (ancient woodland, deciduous woodland, and traditional orchards) is responsible for most of this **carbon capture and storage**. For example, in Greater London alone, trees sequestered 77,200 tonnes of carbon in 2014 – adding to the 2,367,000 tonnes of carbon already stored[148].

Primary impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections (UKCP18)[149], winters in this zone are anticipated to be 1.27°C warmer between 2021-2040 and 3.12°C warmer between 2061-2080 in comparison to 1981-2000 (4.54°C). Warmer summers are also anticipated - with a 2.3°C increase anticipated for

[146] UK Government (2022): UK local authority and regional greenhouse gas emissions statistics
[147] Ibid.
[148] Teeconomics (2015): Valuing London's Urban Forest
[149] Met Office (no date): UKCP data

2021-2040, and a 5.33°C increase for 2061-2080 in comparison to 1981-2000 (15.81°C). Winters in this zone are anticipated to be wetter (increasing to 3.94mm/day in 2061-2080 in comparison to 3.22mm/day in 1981-2000), and drier in the summer (decreasing to 1.05mm/day in 2061-2080 in comparison to 1.71mm/day in 1981-2000). London is considered separately from the South East under the UKCP18 projections – it is anticipated that winter temperature will reach 6.18°C between 2021-2041, and 8.06°C by 2061-2080; and summer temperature will reach 19.3°C between 2021-2040 and 22.32°C between 2061-2080. It is also anticipated to be wetter in the winter by 2061-2080 3(.28mm/day) and drier in the summer in 2061-2080 (1.22mm/day)[150]. Parts of the zone are at risk of coastal change, which could be exacerbated by climate change.

Secondary impacts from climate change are largely linked to changes in temperature, humidity and precipitation. These can be widespread and impact upon ecosystems, people, settlements and infrastructure. Changes in precipitation patterns can lead to an increase in flood events or the occurrence of drought, which can impact on agriculture and natural resources. Increased temperatures can also result in heat-related human mortality, and cause species loss. Additionally, higher temperatures and the occurrence of heatwaves can aggravate air pollution events and also limit the function of key infrastructure – including compromising energy systems. The Intergovernmental Panel on Climate Change (IPCC) outlines that the energy sector is climate-exposed, indicating that energy infrastructure will become increasingly vulnerable if design standards do not account for changing climate conditions[151]. Infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems are viewed as the most feasible adaptation techniques – alongside energy generation diversification (i.e., a greater use of renewable energy)[152].

15.4. Community wellbeing

The population of the South East region is 9,278,065 and the population of the Greater London region is 8,799,728 (ONS Census 2021). The combined population of the South East and Greater London regions is **18,077,793**. The South East region has a population density of 486.5 residents per square km. The Greater London region has a significantly higher population density compared to all English regions of 5,597.6 residents per square km. This is consistent with the Greater London region area being mostly urbanised.

In terms of its age profile, of the nine English regions, **Greater London** has the highest percentage of people of **working age** (68.8%) and a significantly lower proportion of people of retirement age and above, at 11.9% (see Figure 15.3 overleaf) (ONS Census 2021). The age profile for the **South East** region aligns closer to the English average, with 18.6% of people aged 15 and under, 62% of **working age** and 19.4% of retirement age and above

[150] Based on the RCP8.5 emissions scenario, which assumes there is fast population growth, low technical development rate, slow GDP growth, a massive increase in world poverty and high energy use and emissions. It also assumes no climate change mitigation or adaptation techniques are engaged with.
[151] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[152] IPCC (2019): Climate Change and Land

(see Figure 15.3 overleaf). The combined age profile for the zone is 18.9% of people aged 15 and under, 65.3% of working age and 15.8% of retirement age and above.

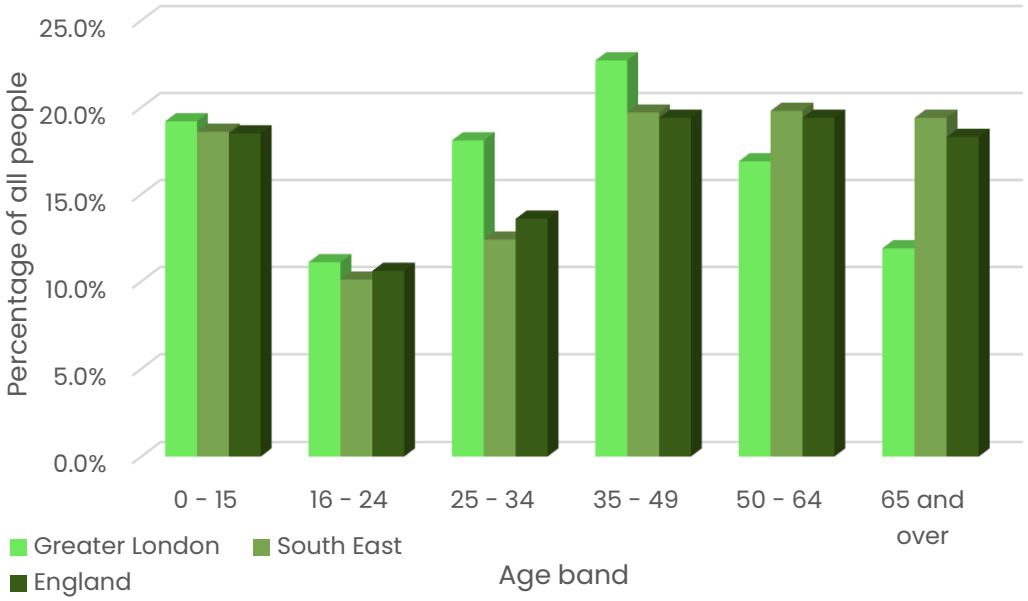


Figure 15.3: Age profile of Zone T11 (source ONS Census 2021)

IMD data from 2019 shows that many parts of this zone have **lower levels of deprivation** compared to other zones in England, including in the Home Counties. However, **London** includes some of the **most deprived** communities in England, including areas in Tower Hamlets, Newham, Hackney, Barking and Dagenham and Brent. Outside of London, there are pockets of deprivation across cities and towns in the South East including Reading, Slough, Chatham and Milton Keynes. The zone also includes coastal settlements with high levels of deprivation, including in Southampton, Portsmouth, Brighton and Hove, Hastings, Dover, Thanet and the Isle of Sheppey.

Key economic sectors in the South East and London include finance and banking, education, government and tourism. The South East has also traditionally been a major producer of fruits and agriculture. Current sectors in the South East and London also include creative industries, legal and professional services, real estate and retail and hospitality. Overall the zone has the strongest economy in GB, and can be categorised as being advanced, high-income, highly skilled, broadly-based and service-oriented.

In Zone T11, the industries with the **highest regional GVA in 2022**[153] were the services sector and real estate activities.

The zone has a comprehensive **rights of way network**. There are four National Trails located in the zone including the 344km Thames Path which starts at the source of the river in Kemble and continues to the Thames Barrier in London. Other National Trails include the 256km North Downs Way, the 183km South Downs Way and part of The Ridgeway.

[153] ONS (2024): Regional gross value added (balanced) by industry: all ITL regions

15.5. Cultural heritage and historic environment

Zone T11, comprising the densely populated London and the South East, includes some of the richest and most diverse **historic environment** in GB.

In the post-Roman period, the historic environment of the zone has in many respects been dominated by the presence of London. Outside of London, conservation areas and listed buildings tend to be concentrated in built up and urban areas. The zone has numerous settlements of considerable historic environment significance, including the ecclesiastical heritage of Canterbury (**3a**) and Winchester (**3b**), the maritime heritage of Portsmouth (**4**) and Chatham (**5**), the seaside heritage of Hastings and Brighton (**6**), the Roman heritage of Chichester (**7**) or the military heritage of Deal, Dover (**8**) and other settlements in Kent (see Figure 15.4 below).

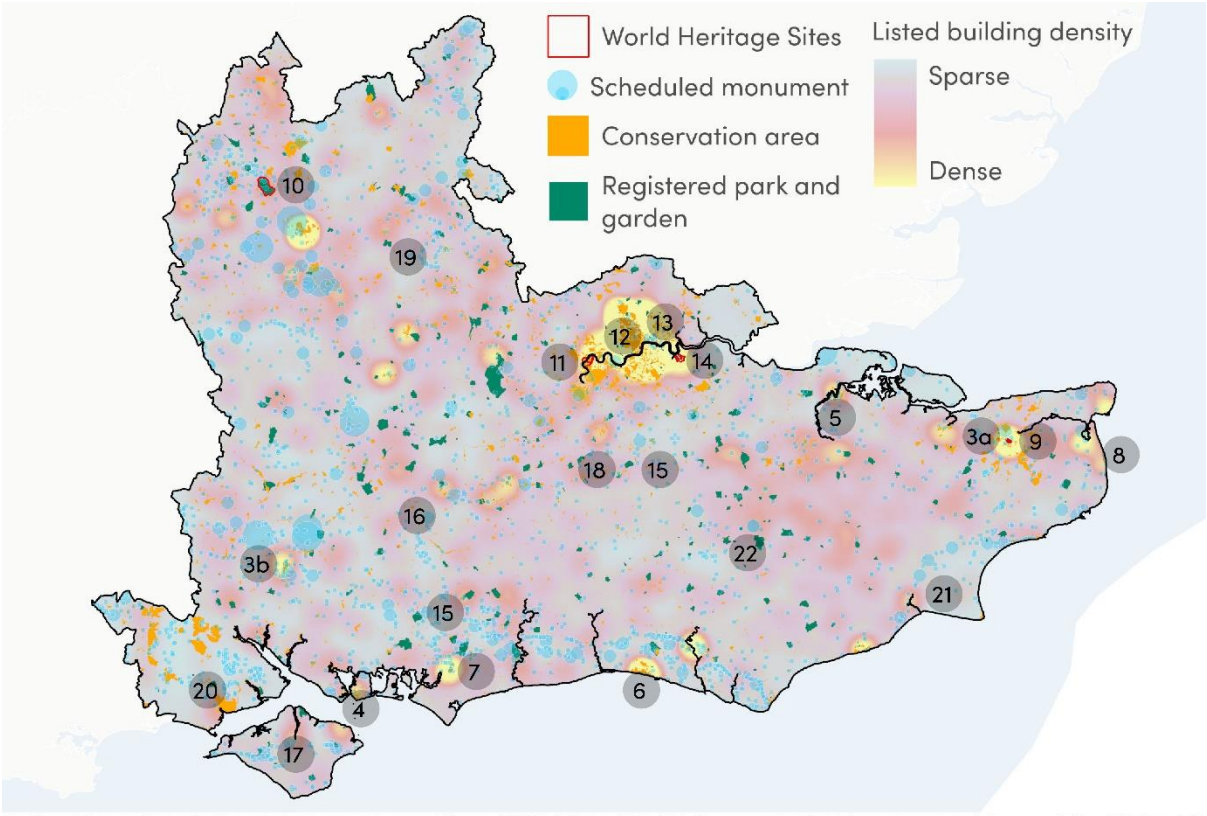


Figure 15.4: Designated heritage assets within Zone T11

The zone includes **five WHSs** (see Figure 15.4 above), as follows:

Canterbury Cathedral, St Augustine's Abbey, and St Martin's Church (**9**): Comprising Christ Church Cathedral Canterbury in Kent, which is the seat of the spiritual head of the Church of England and St Martin's Church and the ruins of St Augustine's Abbey. St Martin's Church, the ruins of St Augustine's Abbey and Christ Church Cathedral together reflect milestones in the history of Christianity in Britain.

Bleinheim Palace, Oxfordshire (**10**): Blenheim is an outstanding example of the work of John Vanbrugh and Nicholas Hawksmoor, two of England's most notable architects. It represents a unique architectural achievement celebrating the triumph of the English

armies over the French, and the Palace and its associated Park have exerted great influence on the English Romantic movement which was characterised by the eclecticism of its inspiration, its return to natural sources and its love of nature.

Royal Botanic Gardens, Kew (**11**): This historic landscape garden features elements that illustrate significant periods of the art of gardens from the 18th to the 20th centuries. The gardens house botanic collections (conserved plants, living plants and documents) that have been considerably enriched through the centuries. Since their creation in 1759, the gardens have made a significant and uninterrupted contribution to the study of plant diversity and economic botany.

Palace of Westminster and Westminster Abbey including Saint Margaret's Church (**12**): Westminster Palace, rebuilt from the year 1840 on the site of important medieval remains, is a fine example of neo-Gothic architecture. The site – which also comprises the small medieval Church of Saint Margaret, built in Perpendicular Gothic style, and Westminster Abbey, where all the sovereigns since the 11th century have been crowned – is of great historic and symbolic significance.

Tower of London (**13**): An internationally famous monument and one of England's most iconic structures. William the Conqueror built the White Tower in 1066 as a demonstration of Norman power, siting it strategically on the River Thames to act as both fortress and gateway to the capital. It is the most complete example of an 11th century fortress palace remaining in Europe. A rare survival of a continuously developing ensemble of royal buildings, from the 11th to 16th centuries, the Tower of London has become one of the symbols of royalty. It also fostered the development of several of England's major State institutions, incorporating such fundamental roles as the nation's defence, its record-keeping and its coinage. It has been the setting for key historical events in European history.

Maritime Greenwich (**14**): The ensemble of buildings at Greenwich, an outlying district of London, and the park in which they are set, symbolize English artistic and scientific endeavour in the 17th and 18th centuries. The Queen's House (by Inigo Jones) was the first Palladian building in England, while the complex that was until recently the Royal Naval College was designed by Christopher Wren. The park, laid out on the basis of an original design by André Le Nôtre, contains the Old Royal Observatory, the work of Wren and the scientist Robert Hooke.

The zone has a rich archaeological resource, ranging from Mesolithic and Neolithic eras, through to Iron Age, Roman and medieval, to Cold War-era remains. Reflecting this diverse resource, a number of areas in the zone have particular densities of **scheduled monuments**. These include the chalk ridgeways of the South Downs (**15**), North Downs (**16**), the Isle of Wight (**17**), the Surrey Downs (**18**) and the Chilterns (**19**). These chalk uplands were favoured by prehistoric people as they were well-drained, easier to clear than the valleys, and there was plenty of flint for tools. In addition to being large concentrations of Neolithic burial sites (including bowl barrows) they include later features such as Iron Age hill forts and medieval barrows.

Outside of London, there are also other particular clusters of archaeological remains in: Portsmouth and Gosport (associated with the area's rich maritime history); the New Forest (**20**) (which has a particular concentration of bowl barrows dating from the late Neolithic

period to the Late Bronze Age); the **Royal Military Canal** in Kent (**21**); and the Weald (**22**) (associated with iron workings from prehistoric, Roman and prehistoric times).

15.6. Ecology and biodiversity

Priority habitats are present across the region and represent a diverse range of habitats and support a wide variety of species. Particularly extensive areas of priority habitat are shown in Figure 15.5 overleaf, and include:

- Coastal and floodplain grazing marsh at the Pevensey Levels (**23**)
- Coastal vegetated shingle and coastal and floodplain grazing marsh at Dungeness, Romney Marsh and Rye Bay (**24**)
- Coastal and floodplain grazing marsh, mudflats, coastal saltmarsh, good quality semi-improved grassland, and saline lagoons at The Swale (**25**)
- Coastal and floodplain grazing marsh, good quality semi-improved grassland, and saline lagoons at the South Thames Estuary & Marshes (**26**)

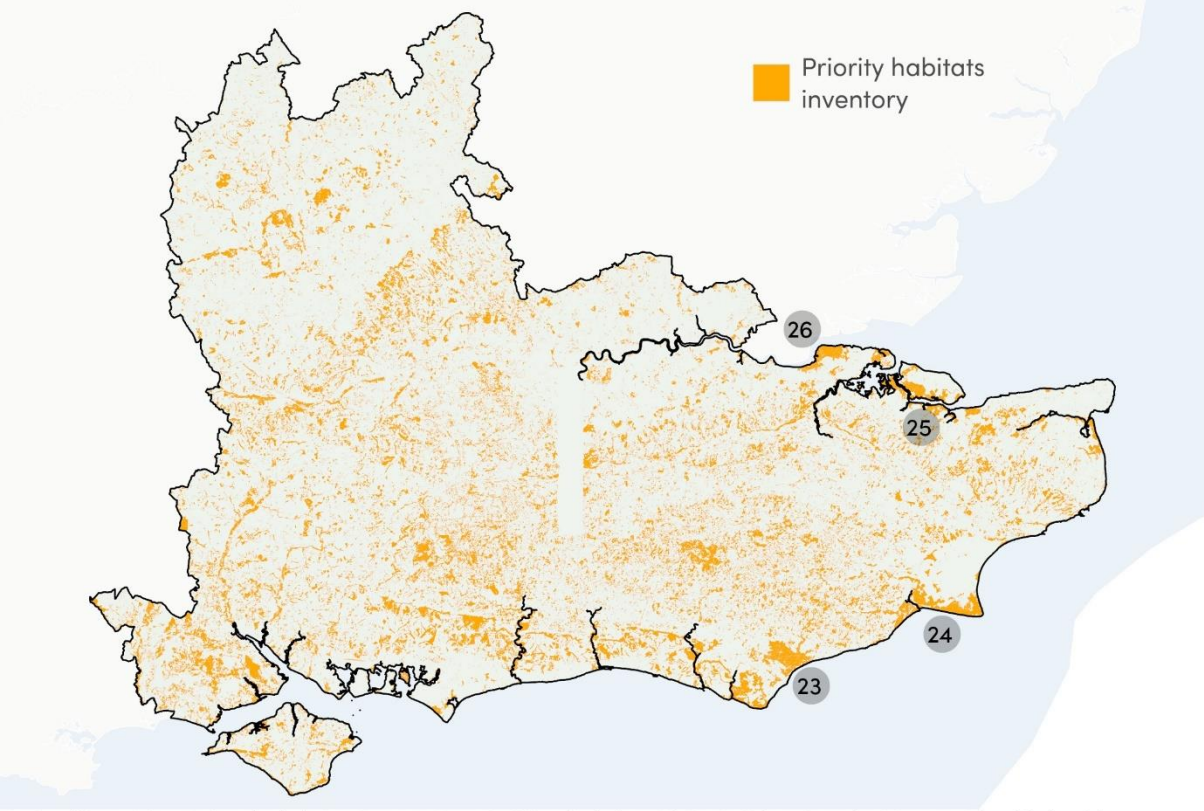


Figure 15.5: Cover of priority habitats in Zone T11

Overall, the area covered by **SAC** designations (including possible SACs) is 57,762 ha (2.8% of the zone); the area covered by **SPA** designations (including potential SPAs) is 61,107 ha (2.96% of the zone); and the area covered by **Ramsar site** designations (including proposed Ramsar sites) is 52,185 ha (2.5% of the zone). Internationally designated sites for biodiversity in the zone, as shown in Figure 15.6 overleaf, include:

- The New Forest SAC, SPA and Ramsar site (**27**)

- Pevensey Levels SAC (**28**)
- Dungeness, Romney Marsh and Rye Bay SAC and Ramsar site (**29**)
- The Swale SPA and Ramsar site (**30**)
- South Thames Estuary & Marshes SPA and Ramsar site (**31**)
- Ashdown Forest SAC and SPA (**32**)
- Thames Basin Heaths SPA and Thursley, Ash, Pirbright & Chobham SPA (**33**)

The area covered by **SSSI** designations is 119,281 ha (5.8% of the zone). Nationally designated sites for biodiversity in the zone, as shown in Figure 15.6 overleaf, include:

- The New Forest SSSI (**27**)
- Pevensey Levels SSSI and NNR (**28**)
- Dungeness, Romney Marsh and Rye Bay SSSI and Dungeness NNR (**29**)
- The Swale SSSI and Elmley NNR (**30**)
- South Thames Estuary & Marshes SSSI (**31**)
- Ashdown Forest SSSI (**32**)
- Broadmoor to Bagshot Woods and Heaths SSSI; Colony Bog and Bagshot Heath SSSI; Ash to Brookwood Heaths SSSI; Bourley and Long Valley SSSI; and Castle Bottom to Yateley and Hawley Commons SSSI (**33**)

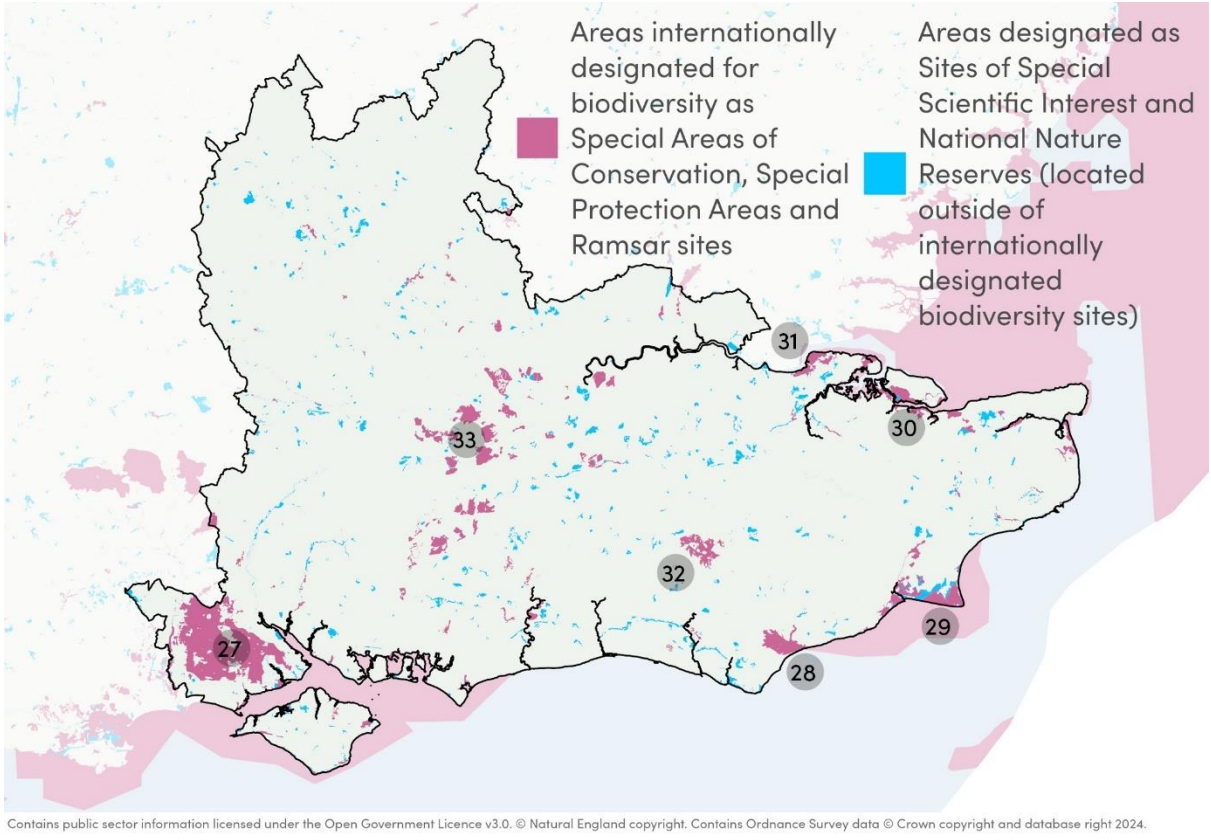


Figure 15.6: Internationally and nationally designated sites for biodiversity in Zone T11

The percentage of the zone covered by **ancient woodland** is 7%, totalling 144,094 ha.

A large proportion of this zone is subject to excess nutrient loads, resulting in a requirement for **nutrient neutrality**. Nutrient neutrality is a means of ensuring that a

development plan or project does not add to existing nutrient burdens within catchments, so there is no net increase in nutrients as a result of the plan or project. Where neutrality measures are needed, the purpose of these mitigation measures is to avoid impacts to the designated sites, rather than compensating for the impacts once they have occurred.[154]

15.7. Land and soil resources

As shown in Figure 15.7 overleaf, Zone T11 includes a large amount of built-up land, resulting in 16% of the zone being classified as **urban**, with large concentrations found around London (**34**), Surrey (**35**) and Berkshire (**36**), and along the south coast (**37**).

Particular concentrations of the **BMV** agricultural land include in Oxfordshire and West Berkshire (**38**), the coastal strip to the south of the South Downs National Park in West Sussex and Hampshire (**39**), Romney Marsh (**40**) and in a band running from Thanet to Gravesend in north Kent (**41**).

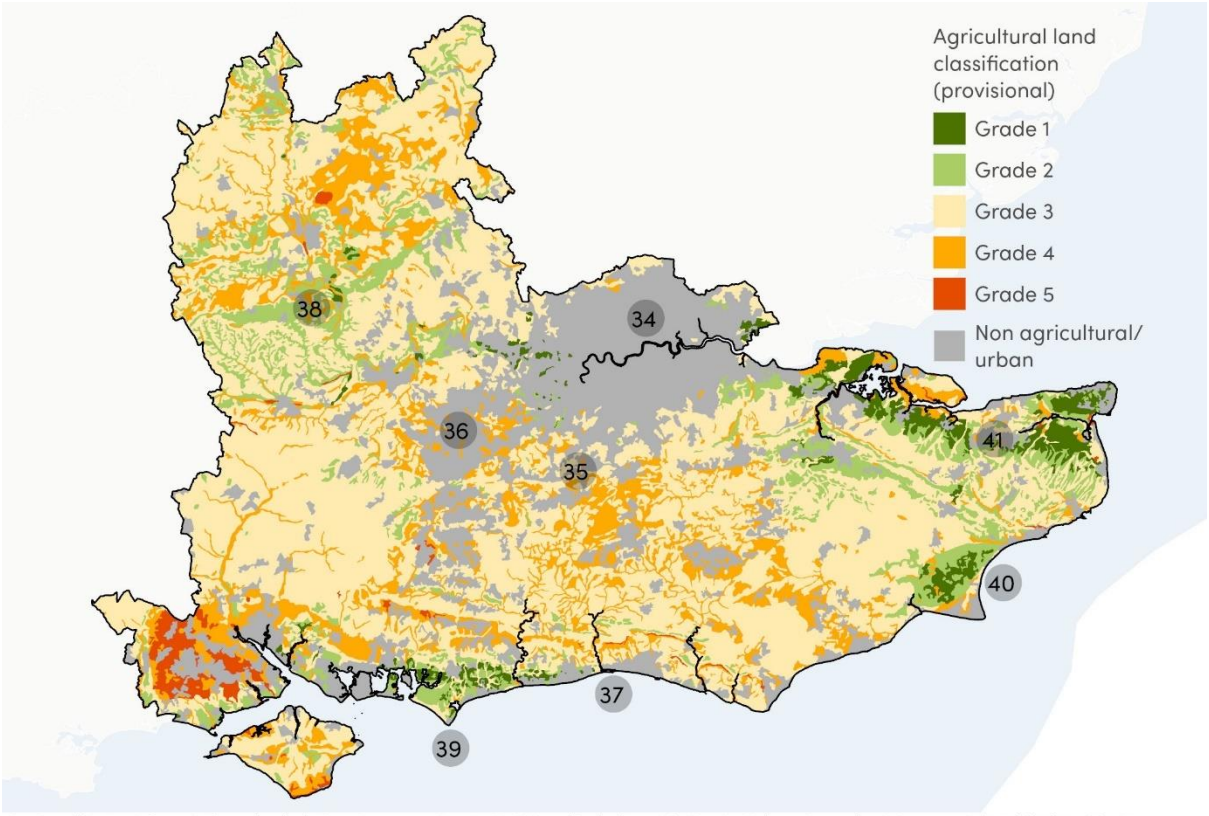


Figure 15.7: Agricultural land classification across Zone T11

15.8. Landscape and seascape

Zone T11 has a diverse range of landscapes, representing a significant breadth of landscape and seascape types which reflect the interplay of the area's topography, geology, biodiversity, land uses and cultural heritage.

[154] Natural England (2023): Nutrient Neutrality Principles (TIN186)

The north of Zone T11 is marked by **rolling hills**, **farmland**, and **sweeping countryside**.

To the south and east, the zone is defined by coastline, including **sandy beaches** and **chalk cliffs** in locations such as Dover, the South Downs and the Isle of Wight. The urban centres on the south coast (such as the port cities of Southampton and Portsmouth) have strong historical connections to **maritime industries**, having played important roles in trade and naval history.

The **River Thames** runs through London in the north-east of the zone, playing a central role in shaping the city's urban landscape. **London** itself is a prominent feature of Zone T11, characterised by its dense urban core, filled with high-rise buildings, and an expansive urban sprawl that stretches into surrounding areas.

A significant proportion of Zone T11 (34.4%) is covered by National Park or National Landscape status: the percent of the zone covered by National Parks is 10.5% (217,258 ha); and the percent covered by National Landscapes is 23.9% (494,126 ha).

The **South Downs National Park** is an upland National Park located in Zone T11 (see Figure 15.8 overleaf). Its special qualities include rolling green hills; chalk grassland; ancient woodlands; dark skies and tranquillity; an extensive network of public rights of way; traditional farming practices; and many historic buildings and structures.

The **New Forest National Park** is a lowland National Park, also located in Zone T11 (see Figure 15.8 overleaf). Its special qualities include ancient woodlands; wild open heathlands; a coastline with unspoilt beaches; tranquillity; an extensive network of public rights of way; traditional commoning practices; and many historic buildings and structures.

Nine National Landscapes are located wholly or partly within Zone T11 (see Figure 15.8 overleaf). These range from the rolling hills and limestone grasslands of the eastern **Cotswolds** to the chalk escarpments and woodlands of the **Chilterns**. The **North Wessex Downs** offer chalk downlands, ancient woodlands, and notable areas such as Walbury Hill and Savernake Forest, while the **Surrey Hills** feature the North Downs and Greensand Ridge, with notable areas such as Leith Hill and Box Hill. The **Kent Downs** encompass chalk downlands, ancient woodlands, and notable areas such as the White Cliffs of Dover and Toy's Hill. The **High Weald** is characterised by its medieval landscape of wooded hills, sandstone outcrops, and notable areas such as Ashdown Forest and Bewl Water. **Chichester Harbour**, a coastal landscape, includes tidal flats, salt marshes, and notable areas such as Bosham and Itchenor. **The Isle of Wight**, known for its coastal scenery and verdant landscapes, features notable areas such as the Needles and Ventnor Botanic Garden. Lastly, **Cranborne Chase and West Wiltshire Downs** offer chalk downlands, wooded areas, and notable spots such as the Larmer Tree Gardens and Old Wardour Castle.

Heritage coasts have been established to conserve the best stretches of undeveloped coast in England. Reflecting the area's distinctive seascapes, a small proportion of Zone T11 (0.03%) is covered by heritage coast.

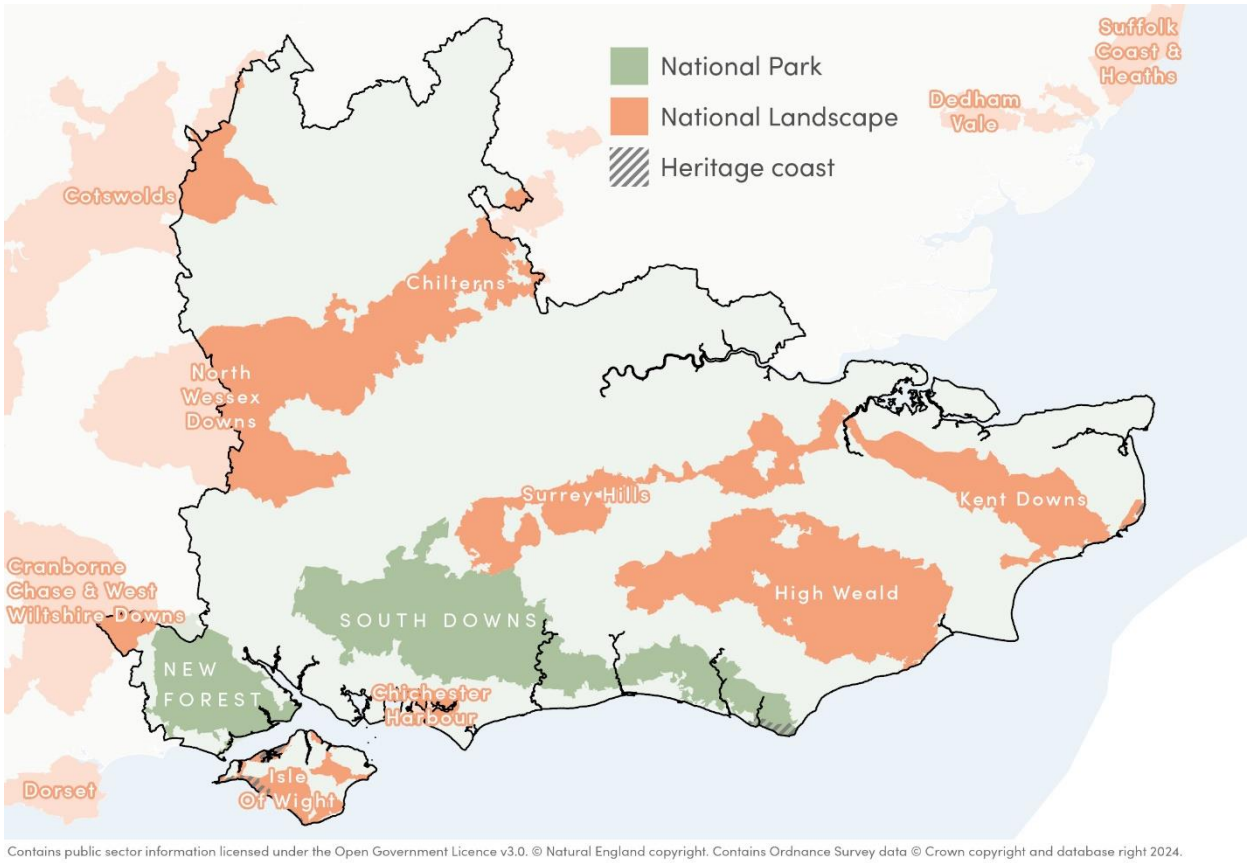


Figure 15.8: Designated landscapes within Zone T11

15.9. Water

According to the WFD river classification data (2019), **24 waterbodies** in Zone T11 are classified as having a **'bad' ecological status**. These are:

- Alver
- Bow Lake
- Bremere Rife
- Broad Rife
- Burstow Stream
- Eden Brook
- Eridge Stream
- Filchampstead Brook to Farmoor
- Framfield Stream
- Lee (Tottenham Locks to Bow Locks / Three Mills Locks)
- Little Horsted Stream
- Ock
- Oxon Ray (upstream A41 to Cherwell) including Otmoor
- Royal Brook
- Somerhill Stream
- Summerstown Ditch and Launton and Cutters Brook
- Teville Stream

- Tributary of River Uck north of Uckfield
- Twyford Brook
- Upper Beult
- Upper Dour
- Upper Great Stour
- Wadley Stream (Source to Thames at Duxford)
- Wandle (Carshalton Branch to Carshalton)

The River Basin District Flood Risk Management Plans that cover Zone T11, and the **FRAs** which falls within the zone, are set out below:

- The **Thames** River Basin District Flood Risk Management Plan 2021 to 2027[155] identifies **24 FRAs** for significant risk of flooding from **main rivers and the sea**: Byfleet and Weybridge, Chertsey, Datchet, Ditton, East Peckham, Egham, Esher, Five Oak Green, Lee Valley, London, London and Thames Estuary, Maidenhead, Marlow, Oxford, Reading, Rochester, Slough, Smallfield, Staines, Tonbridge, Walton-on-Thames, Wokingham, Wraysbury, Yalding, and Yateley. It also identifies **17 FRAs** as being at significant risk of flooding from **surface water**: Chesham, Canvey, Chatham, Crawley, Farnborough, Greater London, Harlow, High Wycombe and the Wye Valley, Luton and Dunstable, Maidenhead, Newbury, Rainham, Reading, Reigate, Slough, Thurrock, and Windsor.
- The **South East** River Basin District Flood Risk Management Plan 2021 to 2027[156] identifies **eight FRAs** for significant risk of flooding from **main rivers and the sea**: Canterbury, Eastbourne and Pevensey Bay, Hastings, Herne Bay, Hythe, Portsmouth, Southampton, and Whitstable. It also identifies **four FRAs** as being at significant risk of flooding from **surface water**: City of Brighton and Hove, Eastbourne, Hastings, and Worthing.
- The **Anglian** River Basin District Flood Risk Management Plan 2021 to 2027[157] identifies 16 FRAs for significant risk of flooding from main rivers and the sea, none of which are in this zone. It also identifies 12 FRAs as being at significant risk of flooding from **surface water**; **one FRA** is in this zone: Milton Keynes.

As highlighted in the South East and Thames River Basin District River Basin Management Plans, particular **challenges facing the water environment** include: climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution. Water availability is also a key consideration, particularly given the effects of climate change and the growth anticipated in the region over the forthcoming decades.

[155] UK Government (2016): Thames River Basin District Flood Risk Management Plan
[156] UK Government (2016): South East River Basin District Flood Risk Management Plan
[157] UK Government (2016): Anglian River Basin District Flood Risk Management Plan

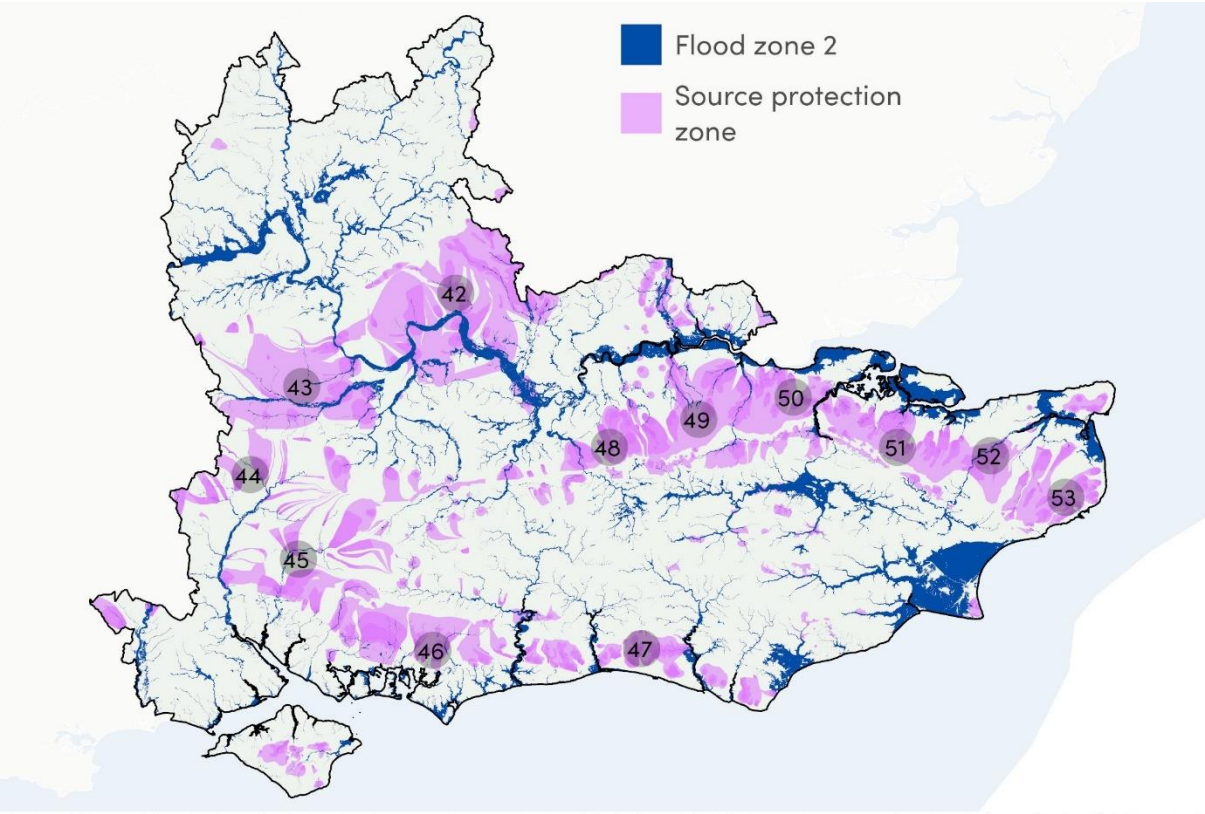


Figure 15.9: Areas of Flood Zone 2 and SPZs and NVZs within Zone T11

As shown in Figure 15.9 above, **SPZs** are mostly present in the vicinity of Amersham and Beaconsfield (**42**), Henley-on-Thames (**43**), Newbury (**44**), Winchester (**45**), Chichester (**46**), Brighton and Hove (**47**), Leatherhead and Caterham (**48**), Sevenoaks and Swanley (**49**), Gravesend and Chatham (**50**), Sittingbourne and Faversham (**51**), Canterbury (**52**), and Dover (**53**).

Water scarcity could become a problem in the South East. In the long-term, four million extra people are forecast to live in the South East. This is why the South East could account for around 50% of the UK's future water demand. Water Resources South East's estimates show the region could need an extra 1 billion litres of water per day over the next 15 years.[158]

15.10.Key issues for Zone T11

The following key issues have been identified through the review of the baseline information for Zone T11:

- Trees and woodlands are a key **carbon store** in the zone.
- Overall the zone has the **strongest economy** in GB, and can be categorised as being advanced, high-income, highly skilled, broadly-based and service-oriented.
- London includes some of the **most deprived** communities in England, including areas in Tower Hamlets, Newham, Hackney, Barking and Dagenham and Brent. Outside of

[158] WRSE (no date): Why do we need to plan ahead to secure our water supplies?

London, there are pockets of deprivation across cities and towns in the South East including Reading, Slough, Chatham and Milton Keynes. The zone also includes coastal settlements with high levels of deprivation, including in Southampton, Portsmouth, Brighton and Hove, Hastings, Dover, Thanet and the Isle of Sheppey.

- Whilst many parts of the zone are heavily urbanised, the zone has a wealth of valued landscapes and seascapes, including two **National Parks** and nine **National Landscapes**.
- The zone has a rich and diverse **historic environment** and **archaeological resource**.
- Zone T11 has a wealth of habitats and species and areas internationally and national designated for their **biodiversity** interest.
- The zone has significant areas of the **best and most versatile** agricultural land.
- Many of the zone's environmental assets are under significant pressures from **housing, employment and infrastructure** growth.
- **24 waterbodies** in Zone T11 are classified as having a **'bad' ecological status**.
- Large parts of Zone T11 are subject to **nutrient neutrality** issues.
- A large proportion of the South East is underlain by **SPZs** and **NVZs**.
- A number of areas have seen significant **flood** events in the last 20 years. Flood risk remains a significant and increasing issue for many settlements.
- Particular challenges facing the **water environment** include climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.
- Water availability is a key issue for the zone, particularly given the effects of climate change and the growth anticipated in the South East region over the forthcoming decades.

16. Zone T12: South West England

Overview of Zone T12

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for T12

16.1. Overview of Zone T12

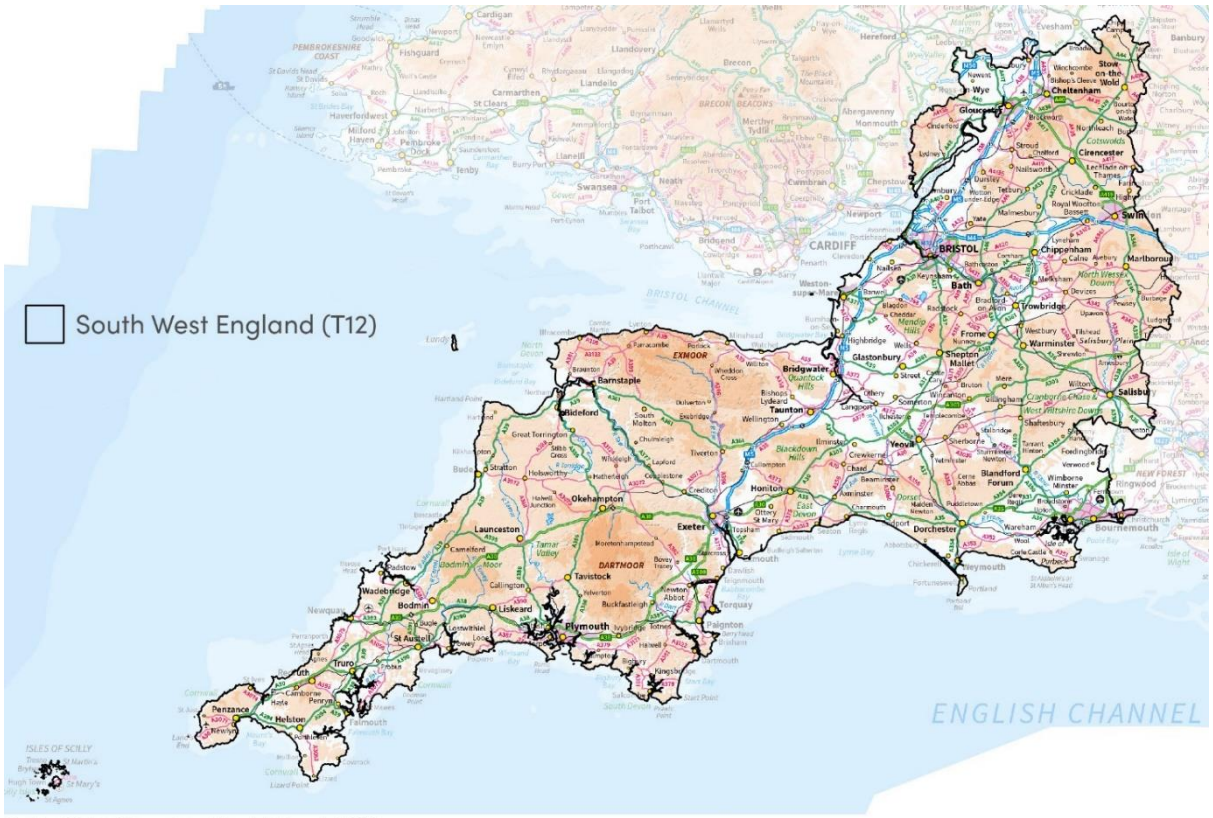


Figure 16.1: Area covered by Zone T12 – South West England

Zone T12 comprises the South West region of England.

Zone T12 (as shown in Figure 16.1 above) covers **23,837 km²** (18% of England) and has the longest coastline of any English region. With a population of **5,701,186**, its largest conurbations are Bristol, Bournemouth / Poole and Plymouth. Other key urban areas include Truro, Exeter, Torbay, Taunton, Dorchester, Weymouth, Salisbury, Bath, Swindon, Gloucester and Cheltenham.

Surrounded on three sides by the sea, and extending from the Isles of Scilly in the west to the New Forest in the east, and the Lizard peninsula in the south to the Cotswolds in the north, the zone comprises a diverse range of landscapes and seascapes. Reflecting the quality of the landscape and seascape, the zone includes two National Parks and 15 National Landscapes, and a significant proportion of the zone's coastline has been defined as a Heritage Coast. The zone also has a rich and varied historic environment and is abundant in natural capital assets.

Outside of the urban centres, the South West is one of the most rural regions. Approximately 6% of land in the South West is built-up, significantly lower than the UK average.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

16.2. Air quality

Air quality issues in the zone are largely associated with traffic and transport. As highlighted by the location of the **44 AQMAs** in the zone, areas of poor air quality are largely located in urban areas and along key roads (see Figure 16.2 below). These are primarily designated for exceedances in the annual mean concentration objective of 40µg/m^3 for NO_2.

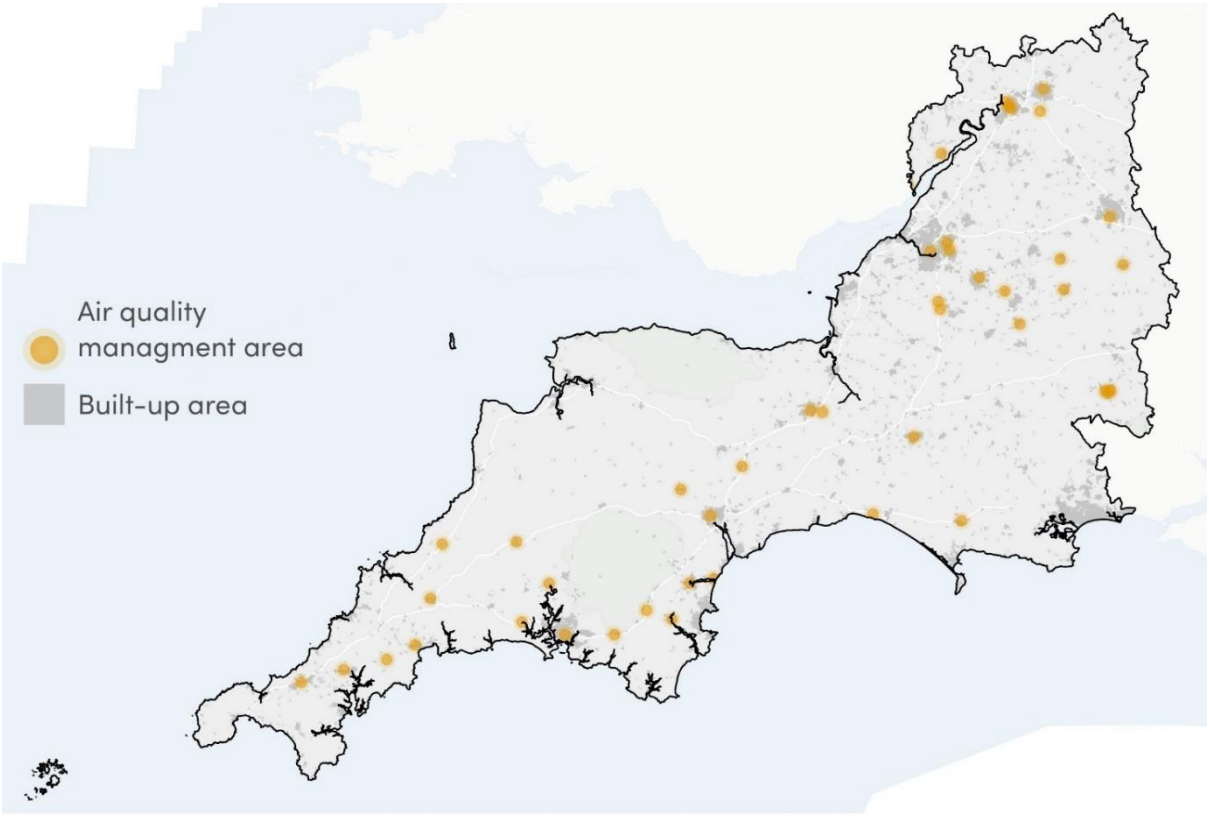


Figure 16.2: AQMAs in Zone T12

16.3. Climate change

The South West contributed a total of **29,972.1 kt CO_2e** to UK GHG emissions in 2022. The largest contributor was the **transport sector**, which was responsible for approx. 36% of emissions in 2022. This is followed by the agriculture sector (approx. 24.7% of emissions) and the domestic sector (approx. 22.2%).[159]

[159] UK Government (2022): UK local authority and regional greenhouse gas emissions statistics

The **land use, land use change and forestry sector** contributed to removing 1,572.8 kt CO_2e in this zone in 2022. As such, it is considered that the South West has **significant stores of carbon**. This includes woodland (located across the region) and peatland (with particular resources located in West Penwith, Bodmin Moor, Dartmoor and Exmoor). There are also significant opportunities for improving carbon stores; for example Cornwall is one of the least wooded counties in the UK, and there is significant degradation of peatland in some locations, as reflected by the South West Peatland Partnership, which is a £13 million collaborative project aiming to restore 2,600 hectares of degraded peatland across the region. The total area of peatland in the zone is 73,138 ha.

Primary impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections (UKCP18)[160], winters in this zone are anticipated to be 1.18°C warmer between 2021-2040 and 2.95°C warmer between 2061-2080 in comparison to 1981-2000 (5.05°C). Warmer summers are also anticipated - with a 2.11°C increase anticipated for 2021-2040, and a 5.07°C increase for 2061-2080 in comparison to 1981-2000 (15.14°C). Winters in this zone are anticipated to be wetter (increasing to 4.97mm/day in 2061-2080 in comparison to 4.11mm/day in 1981-2000), and drier in the summer (decreasing to 1.21mm/day in 2061-2080 in comparison to 2.07mm/day in 1981-2000)[161].

Secondary impacts from climate change are largely linked to changes in temperature, humidity and precipitation. These can be widespread and impact upon ecosystems, people, settlements and infrastructure. Changes in precipitation patterns can lead to an increase in flood events or the occurrence of drought, which can impact on agriculture and natural resources. Increased temperatures can also result in heat-related human mortality, and cause species loss. Additionally, higher temperatures and the occurrence of heatwaves can aggravate air pollution events and also limit the function of key infrastructure – including compromising energy systems. The Intergovernmental Panel on Climate Change (IPCC) outlines that the energy sector is climate-exposed, indicating that energy infrastructure will become increasingly vulnerable if design standards do not account for changing climate conditions[162]. Infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems are viewed as the most feasible adaptation techniques – alongside energy generation diversification (i.e., a greater use of renewable energy)[163].

16.4. Community wellbeing

The population of the South West region is **5,701,186** (ONS Census 2021). It has a population density of 239.2 residents per square km, which is the lowest of any English region.

[160] Met Office (no date): UKCP data

[161] Based on the RCP8.5 emissions scenario, which assumes there is fast population growth, low technical development rate, slow GDP growth, a massive increase in world poverty and high energy use and emissions. It also assumes no climate change mitigation or adaptation techniques are engaged with.

[162] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability

[163] IPCC (2019): Climate Change and Land

In terms of its age profile, of the nine English zones, T12 has the highest percentage of people of **retirement age** and above, at 22.4% (see Figure 16.3 overleaf). A lower proportion (17%) of the population is aged 15 and under than English averages (ONS Census 2021).

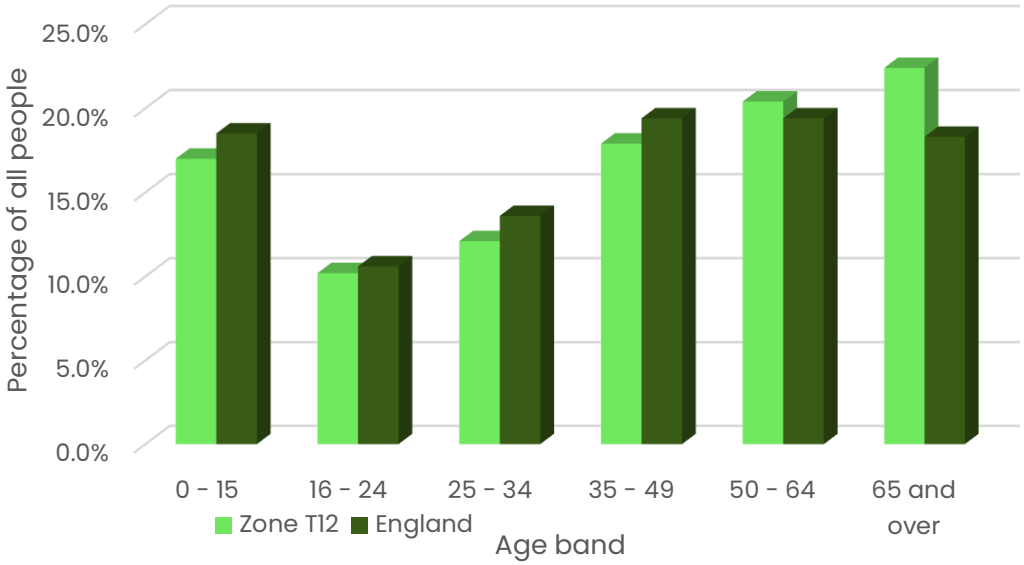


Figure 16.3: Age profile of Zone T12 (source ONS Census 2021)

IMD data from 2019 shows that particular **pockets of deprivation** in the zone are found in Penzance, Camborne and Redruth, Plymouth, Torbay, Bristol and Gloucester. In line with other coastal and remote areas of the country, rural parts of the zone are relatively more deprived than other rural areas nationally.

Key 'traditional' economic sectors in the zone include agriculture, fishing and mining. The popularity of the region as a holiday destination also means tourism makes a significant seasonal contribution to the local economy.

Other key sectors of the economy include marine, defence, food and drink and education. The zone is also rich in natural assets which can benefit the energy transition, including geothermal, wave, tidal, wind and solar. These offer significant economic opportunities.

A number of locations in the zone have historically seen significant **mining activities**, contributing to cultural identity in these areas. Various locations in Cornwall and Devon saw the extraction of tin and copper up to the late 20th Century and coal was extracted from northern Somerset and southern Gloucestershire until the 1970s. The extraction of china clay (kaolin) continues to be of considerable importance, particularly in the St Austell area and there have also been developing plans to extract lithium reserves in Cornwall.

In Zone T12, the industries with the **highest regional GVA in 2022**[164] were the services sector and real estate activities.

The region has an excellent **rights of way network**, and is a centre for nature-based recreation, leisure and tourism. There are two National Trails located in the zone, including

[164] ONS (2024): Regional gross value added (balanced) by industry: all ITL regions

the 1,014 km South West Coast Path, which runs from Poole Harbour to Minehead in Somerset, and the 164km Cotswold Way, which runs from Chipping Campden in Gloucestershire to Bath.

16.5. Cultural heritage and historic environment

Given the more recent history of human settlement in the zone, conservation areas and listed buildings tend to be concentrated in built up and urban areas (see Figure 16.4 below). However, whilst the historic environment of larger settlements such as Cheltenham, Gloucester, Bristol, Bath, Salisbury, Dorchester, Weymouth, Exeter and Truro are important, the rich historic environment of smaller towns, villages and hamlets in the South West are reflected by the significant number of designations in those locations. For example, there are clusters of such designations in the more rural areas of south Somerset (**1**) Gloucestershire (**2**) and north west Wiltshire (**3**). This is also reflected by the distribution of registered parks and gardens, where a greater density is present in the historically more affluent eastern and northern parts of the region

The zone includes **four WHSs** (as shown in Figure 16.4 overleaf):

- The **Cornwall and West Devon Mining Landscape** (**4**) was inscribed as a UNESCO World Heritage Site in 2006, encompassing ten areas within the region with significant mining heritage. The WHS reflects the transformation of the landscape of parts of Cornwall and West Devon in the 18th and early 19th century as a result of the rapid growth of copper and tin mining activities.
- The **Jurassic Coast** (**5**) stretches from Exmouth in East Devon to Studland Bay in Dorset. Inscribed by UNESCO in 2001, the Jurassic Coast is the only natural WHS in England due to its outstanding rocks, fossils and landforms. The designation includes coastal exposures along the Dorset and East Devon coast which provide an almost continuous sequence of Triassic, Jurassic and Cretaceous rock formations spanning the Mesozoic Era, documenting approximately 185 million years of Earth's history
- The **City of Bath** (**6**) WHS was inscribed for its Roman remains, including the Temple of Sulis Minerva and the baths complex, and the Georgian spa city, representing its quality of architecture and urban design.
- The **Stonehenge** (**7a**) & **Avebury** (**7b**) WHS was inscribed in 1986. Stonehenge and Avebury gained their place on the World Heritage Site list for their outstanding prehistoric monuments dating back over 5000 years to the Neolithic and Bronze Age. Stonehenge is the most famous and sophisticated prehistoric stone circle in the world and at Avebury its banks and ditches of the henge enclose its largest. Both stone circles lie at the heart of prehistoric landscapes containing numerous impressive and well-preserved ceremonial monuments.

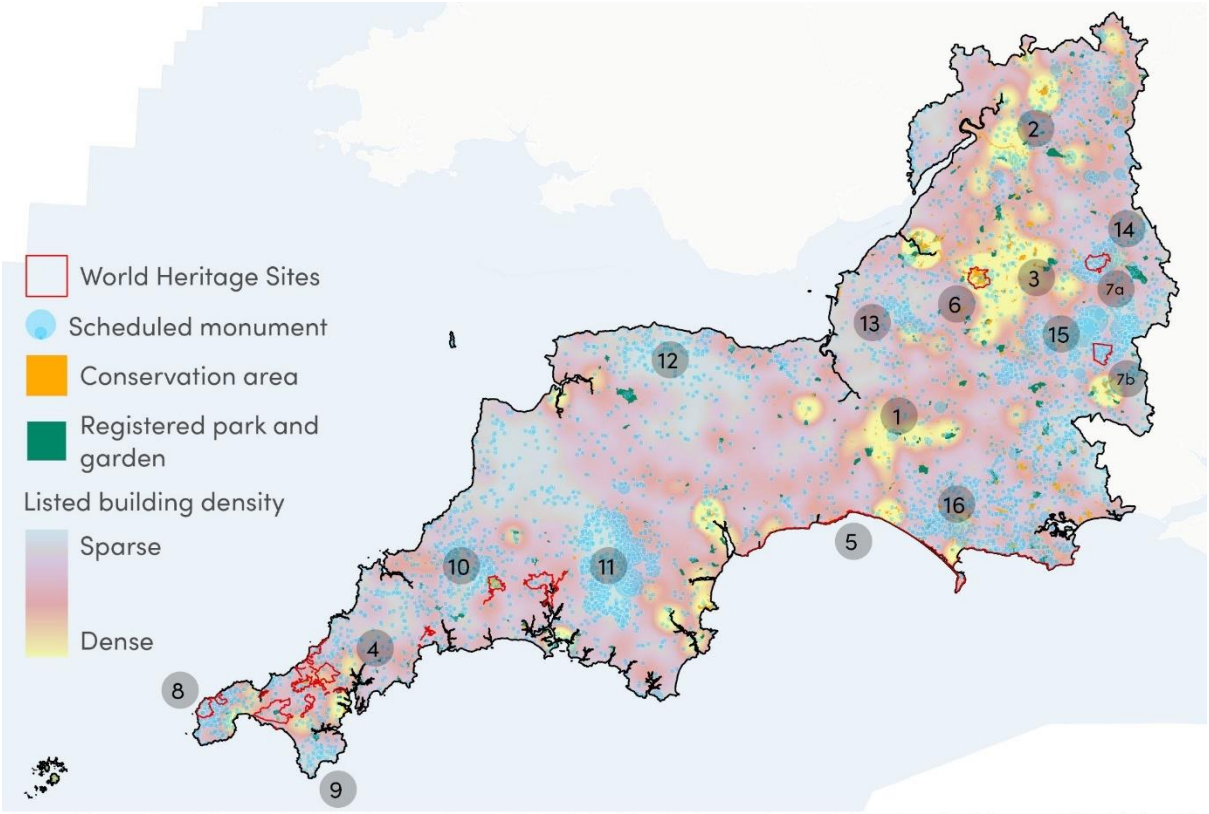


Figure 16.4: Designated heritage assets within Zone T12

The zone has a rich archaeological resource, including a diverse variety of Mesolithic, Neolithic, early Bronze age and medieval archaeology. Reflecting this diverse resource, a number of areas in the zone have particular densities of **scheduled monuments**. These include West Penwith (**8**), the Lizard Peninsula (**9**), Bodmin Moor (**10**), Dartmoor (**11**) (which contains the largest concentration of Bronze Age remains in the country), Exmoor (**12**), the Somerset Levels (**13**), Marlborough Downs / Avebury (**14**), Salisbury Plain (**15**) (which is one of the richest archaeological landscapes in GB), and the Dorset ridgeways (**16**).

16.6. Ecology and biodiversity

Priority habitats are present across the region and represent a diverse range of habitats and support a wide variety of species. Particularly extensive areas of priority habitat are shown in Figure 16.5 overleaf, and include:

- Lowland heathland at The Lizard Peninsula (**17**)
- Upland heathland and upland flushes, fens and swamps at Bodmin Moor (**18**)
- Blanket bog, grass moorland, upland heathland, and deciduous woodland in Dartmoor National Park (**19**)
- Sand dunes and coastal and floodplain grazing marsh at Braunton Burrows (**20**)
- Upland heathland, blanket bog and grass moorland in Exmoor National Park (**21**)
- Coastal and floodplain grazing marsh, lowland fens, and lowland raised bog in the Somerset Levels (**22**)
- Lowland calcareous grassland in the Salisbury Plain (**23**)

- Lowland heathland and coastal and floodplain grazing marsh at South Dorset and Purbeck (**24**)

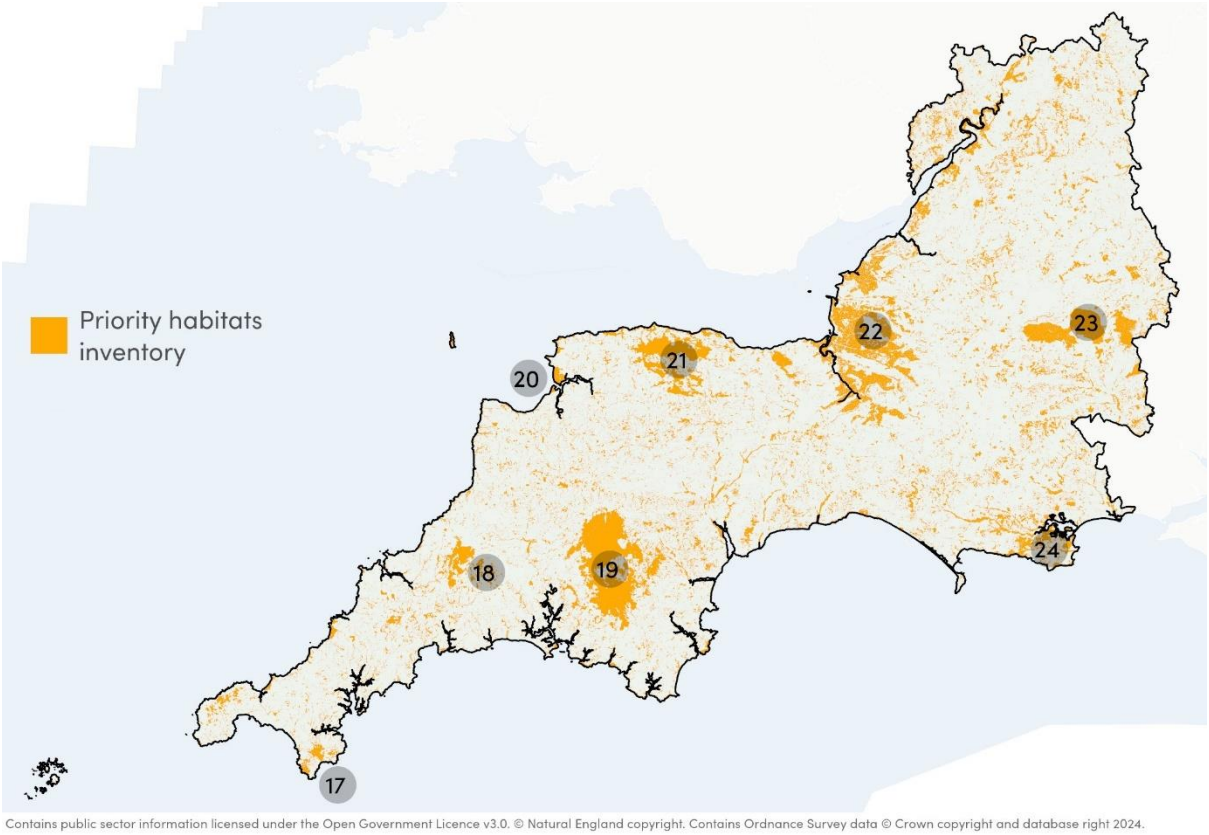


Figure 16.5: Cover of priority habitats in Zone T12

Overall, the area covered by **SAC** designations (including possible SACs) is 87,456 ha, (3.67% of the zone); the area covered by **SPA** designations (including potential SPAs) is 41,959 ha (1.76% of the zone); and the area covered by **Ramsar site** designations (including proposed Ramsar sites) is 17,770 ha (0.75% of the zone). Internationally designated sites for biodiversity in the zone, as shown in Figure 16.6 overleaf, include:

- Dartmoor SAC (**25**)
- Exmoor Heaths SAC (**26**)
- Somerset Levels & Moors SPA and Ramsar site (**27**)
- Salisbury Plain SAC and SPA (**28**)
- Dorset Heathlands SPA and Ramsar site / Dorset Heaths SAC (**29**)

The area covered by **SSSI** designations is **146,660 ha**, which equates to 6.15% of the zone. Nationally designated sites for biodiversity in the zone, as shown in Figure 16.6 overleaf, include:

- North and South Dartmoor SSSIs (**25**)
- North and South Exmoor SSSIs and Dunkery & Horner Wood NNR (**26**)
- Tealham and Tadham Moors SSSI; Westhay Moor SSSI; Shapwick Heath SSSI; King's Sedgemoor SSSI; West Sedgemoor SSSI; Curry and Hay Moors SSSI; Southlake Moor SSSI; Wet Moor SSSI; North Moor SSSI; West Moor SSSI; and Somerset Wetlands NNR (**27**)

- Salisbury Plain SSSI (**28**)
- Povington and Grange Heaths SSSI; Hartland Moor SSSI; Studland & Godlingston Heaths SSSI; Arne SSSI; and Purbeck Heaths NNR (**29**)
- West Penwith Moors and Downs SSSI (**30**)
- Bodmin Moor, North SSSI (**31**)
- The Quantocks SSSI (**32**)

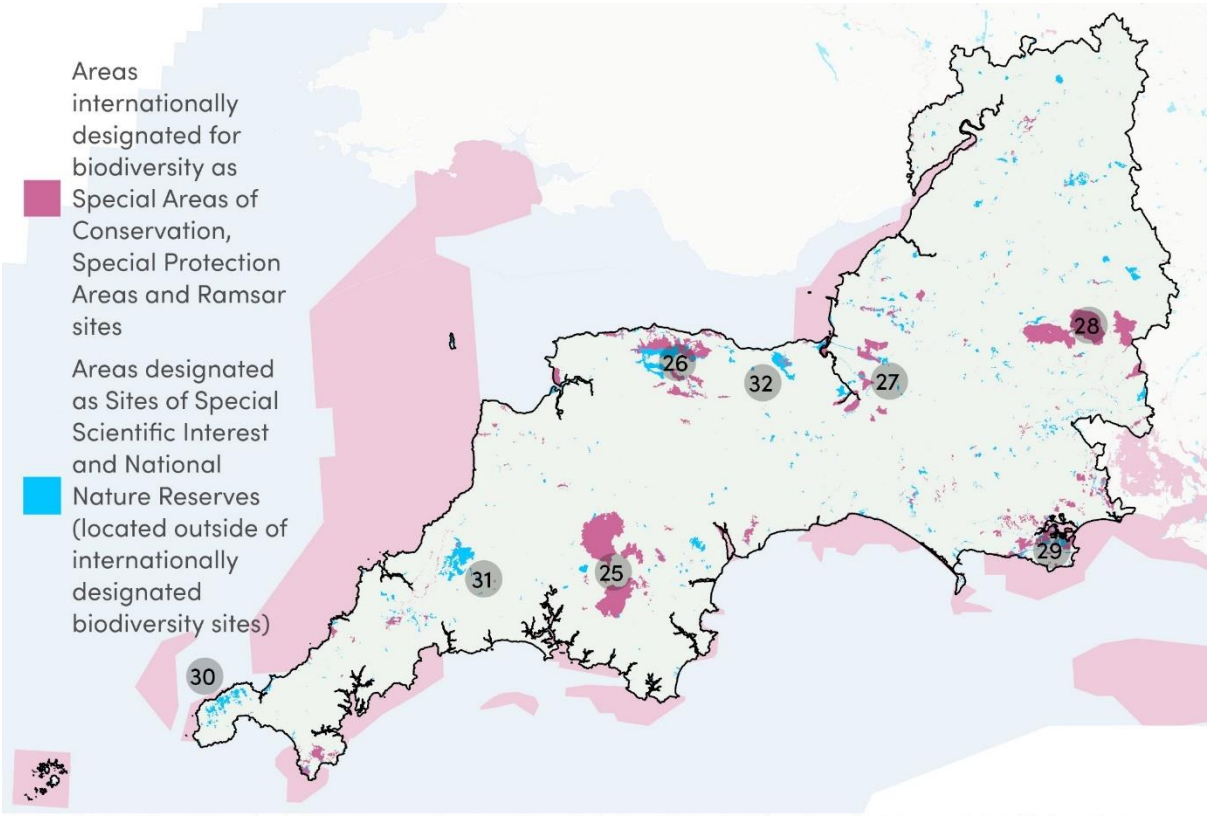


Figure 16.6: Internationally and nationally designated sites for biodiversity in Zone T12

The percent of the zone covered by **ancient woodland** is 3.1%, totalling 73,138 ha.

16.7. Land and soil resources

As shown in Figure 16.7 overleaf, given the topography, geology and geomorphology of Zone T12, many areas are of lower agricultural land quality when compared with other regions of England. Locations of **higher quality** agricultural land in the zone include the Vale of Pewsey (**33**); the Chew Valley (**34**); the area around Taunton, Bridgwater and Ilminster (**35**), the River Exe and its tributaries (**36**); an area east of the Camel Estuary (**37**) and around the Fal and Helford Estuaries (**38**).

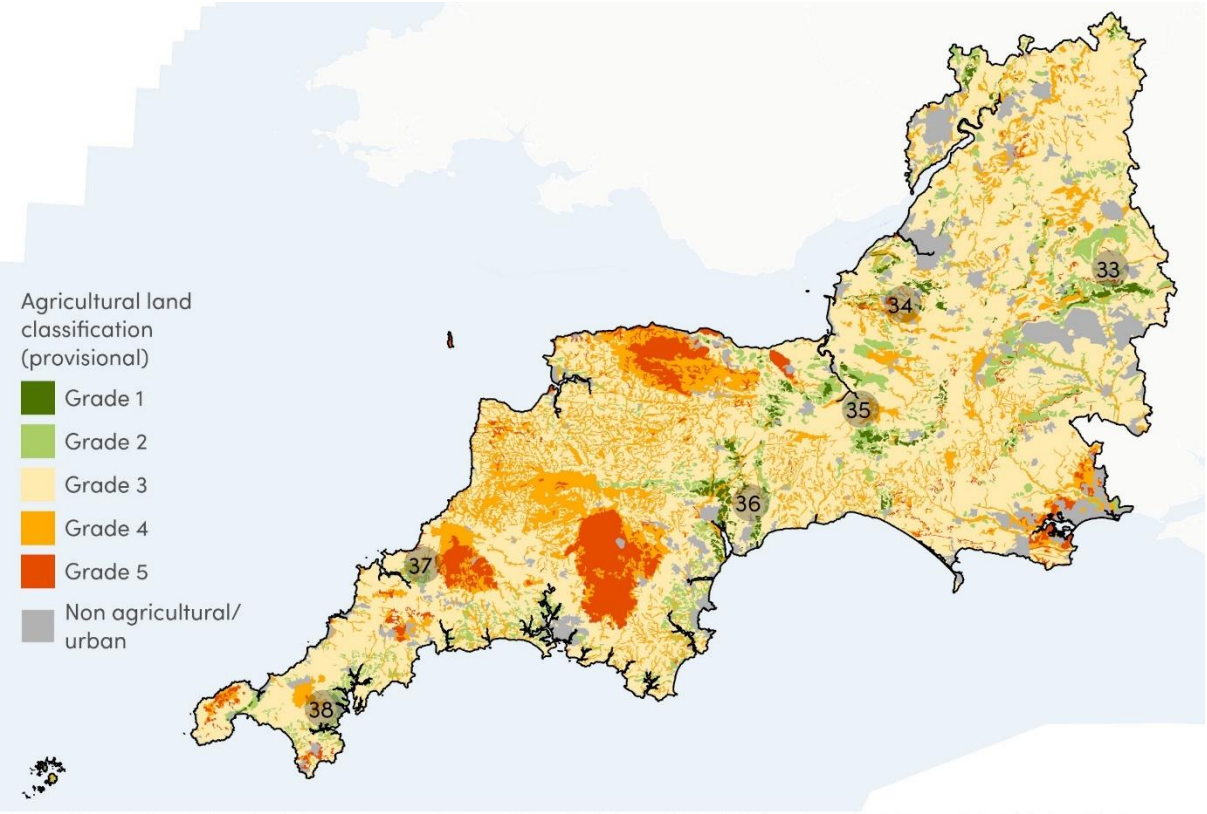


Figure 16.7: Agricultural land classification across Zone T12

16.8. Landscape and seascape

Zone T12 has a diverse range of landscapes, representing a significant breadth of landscape and seascape types which reflect the interplay of the South West's topography, geology, biodiversity, land uses and cultural heritage.

Zone T12 is characterised by **rolling hills**, such as the Mendips and the Quantocks in the north, and distinctive coastlines to the south, including the **cliffs** of Cornwall and the **beaches** of Devon. The coastline is dotted with smaller seaside towns (such as St Ives), larger resort towns (such as Bournemouth), and historic sites (such as Tintagel Castle).

Historically, **tin and copper mining** have left a distinct mark on the Zone's landscape, particularly in Cornwall, where remains of mines can be found.

The north-eastern area in Zone T12 is home to denser **urban centres** (such as Bath and Bristol), which are surrounded by fertile **agricultural land**, where dairy farming and arable cultivation are common.

A significant proportion of the South West (36.4%) is covered by National Park or National Landscape status: the percent of the zone covered by National Parks is 7% (167,475 ha); and the percent covered by National Landscapes is 29.4% (701,430 ha).

Dartmoor National Park is an upland National Park located in Devon (see Figure 16.8 overleaf). Its special qualities include open, windswept upland moors with far reaching views and a sense of remoteness and wildness; sheltered valleys; enclosed farmland; a varied geology; timelessness; tranquillity; an exceptional rights of way network; traditional

farming practices; clean water; one of the most important archaeological landscapes in western Europe; and a wealth of historic buildings, structures and townscapes.

Exmoor National Park is located in north Devon and west Somerset (see Figure 16.8 overleaf). Its special qualities include: large areas of open moorland providing a sense of remoteness, wildness and tranquillity; a distinct and diverse landscape of softly rounded hills and ridges, with heather and grass moors, spectacular coast, deeply incised wooded valleys, high sea cliffs, fast flowing streams, traditional upland farms and characteristic beech hedgebanks; views, tranquillity and dark skies; a mosaic of habitats supporting a great diversity of wildlife; a complex and rich historic landscape; and a deeply rural community closely linked to the land.

The **New Forest National Park**, which adjoins the zone, is a lowland National Park, also located in Zone T12 (see Figure 16.8 overleaf). Its special qualities include ancient woodlands; wild open heathlands; a coastline with unspoilt beaches; tranquillity; an extensive network of public rights of way; traditional commoning practices; and many historic buildings and structures.

15 National Landscapes are located wholly or partly within Zone T12 (see Figure 16.8 overleaf). These range from the coastal landscapes and seascapes of the **Isles of Scilly, Cornwall, North Devon, South Devon** and **Dorset** to the inland landscapes of the **Wye Valley**, **Malvern Hills, Cotswolds**, **Quantock Hills**, **Mendip Hills**, **Cranborne Chase & West Wiltshire Downs**, **North Wessex Downs**, **West Wiltshire Downs**, **Tamar Valley**, **Blackdown Hills** and **Bodmin Moor**.

Heritage coasts have been established to conserve the best stretches of undeveloped coast in England. Reflecting Zone T12's distinctive seascapes, most of the Dorset, Devon and Cornwall coastline is covered by heritage coast; 60% of the UK's heritage coasts are within the Zone.

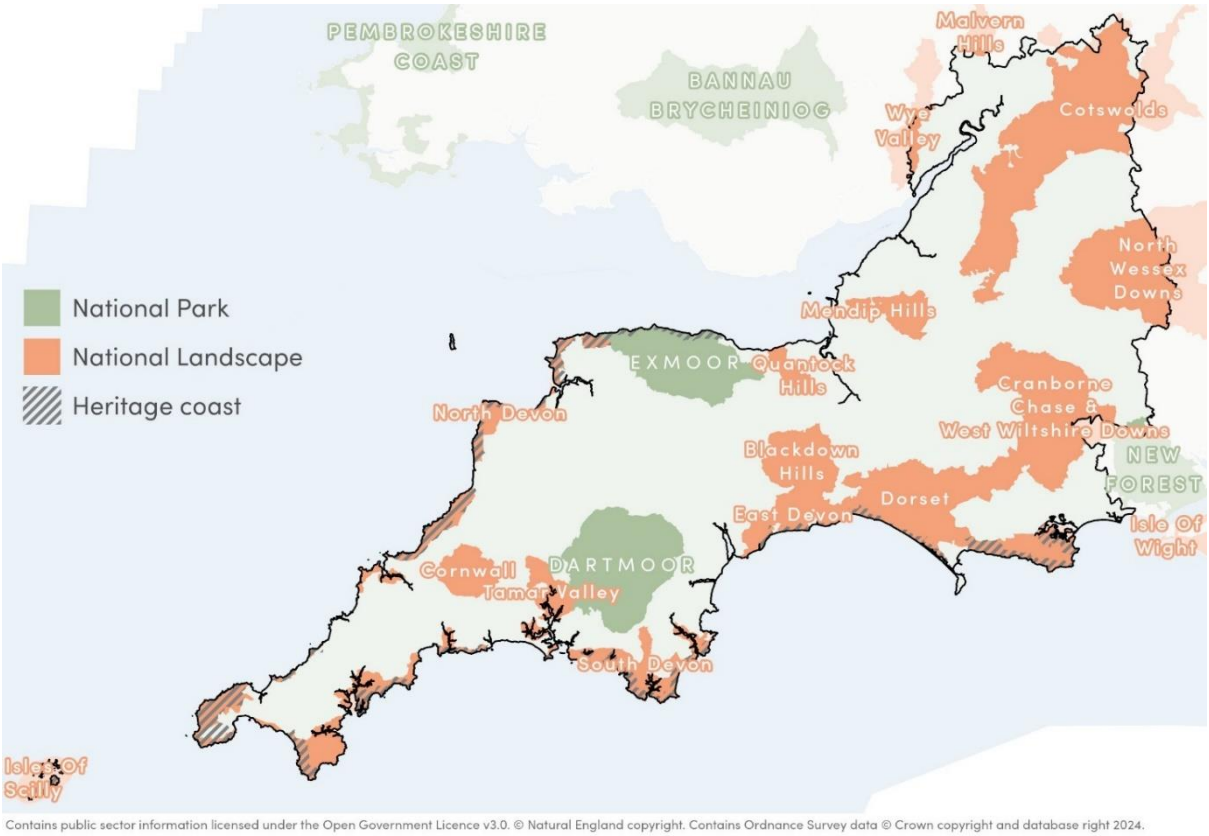


Figure 16.8: Designated landscapes within Zone T12

16.9. Water

According to the WFD river classification data (2019), **10 waterbodies** in Zone T12 are classified as having a **'bad' ecological status**. These are:

- Derril Water
- Derry Brook
- Devils Brook
- Fontmell Brook
- Halberton Stream
- Lodden
- Lower Creedy
- North Winterbourne
- Sydling Water
- Wareham Forest Stream

The River Basin District Flood Risk Management Plans that cover Zone T12, and the **FRAs** which falls within the zone, are set out below:

- The **South West** River Basin District Flood Risk Management Plan 2021 to 2027[165] highlights **17 FRAs** for significant risk of flooding from **main rivers and the sea**: Barnstaple; Bridgwater; Burnham-on-Sea; Cullompton; Dawlish; Exeter; Exmouth;

[165] Environment Agency (2022): South West River Basin District River Basin Management Plan: Updated 2022

Ilfracombe; Minehead; Mounts Bay; Newton Abbot; Plymouth; Portreath; St Blazey and Par; Taunton; Tiverton; and Weston-Super-Mare. It also identifies **two FRAs** as being at significant risk of flooding from **surface water**: Exeter; and Plymouth.

- The **Severn River** Basin District Flood Risk Management Plan 2021 to 2027[166] highlights **three FRAs** for significant risk of flooding from **main rivers and the sea**: Bath, Bristol and Gloucester. It also highlights **two FRAs** as being at significant risk of flooding from **surface water**: Bristol and Cheltenham.

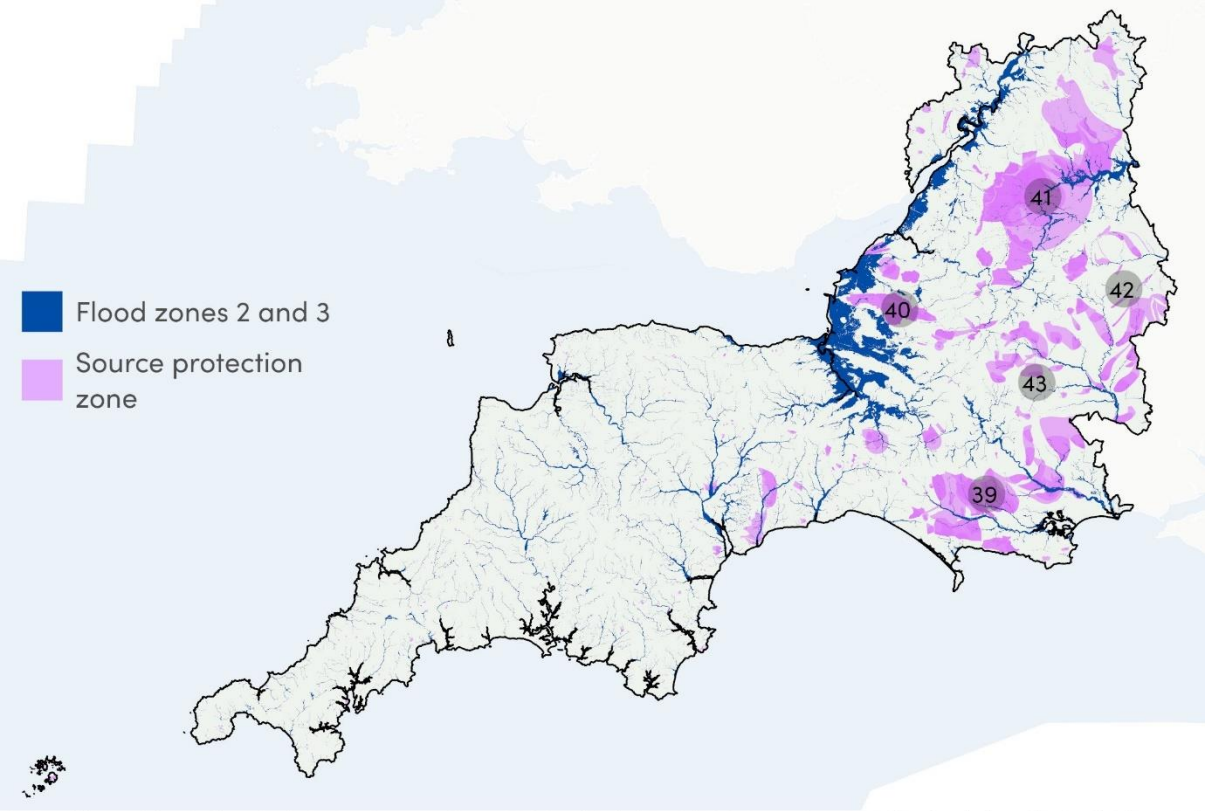


Figure 16.9: Areas of Flood Zone 2 and SPZs and NVZs within Zone T12

As shown in Figure 16.9 above, **SPZs** are mostly present in the vicinity of the Dorset Downs (**39**), the Mendip Hills (**40**), the Cotswolds (**41**), the North Wessex Downs (**42**), and the Salisbury Plain (**43**).

As highlighted in the South West River Basin District River Basin Management Plan, particular **challenges facing the water environment** include: climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution. Bathing water quality has also been an increasing issue in the zone over the last five years.

[166] Environment Agency (2022): Severn River Basin District River Basin Management Plan: Updated 2022

16.10.Key issues for Zone T12

The following key issues have been identified through the review of the baseline information for Zone T12:

- Outside of the urban centres, the South West is one of the **most rural** regions in England. Approximately 6% of land in the South West is built-up, significantly lower than the GB average.
- There are significant opportunities for improving **carbon stores**, for example Cornwall is one of the least wooded counties in GB, and there are particular peat resources located in West Penwith, Bodmin Moor, Dartmoor and Exmoor.
- Of the nine English regions, the South West has the highest percentage of people of **retirement age and above**. In addition, a lower proportion of the population is aged 15 and under than English averages.
- The zone is rich in natural assets which can benefit the **energy transition**, including geothermal, wave, tidal, wind and solar. These offer significant economic opportunities.
- Surrounded on three sides by the sea, the zone has a rich **maritime heritage**. The zone contains the key fishing port of Newlyn, as well as numerous smaller fishing centres.
- The zone has a rich **archaeological resource**, including a diverse variety of Mesolithic, Neolithic, early Bronze age and medieval archaeology. This includes at Salisbury Plain, which is one of the richest archaeological landscapes in GB, and Dartmoor, which contains the largest concentration of Bronze Age remains in the country.
- A significant proportion of the zone's coastline has been defined as a **Heritage Coast**.
- Over a third of the zone is covered by **National Park** or **National Landscape** status The zone includes two National Parks and 15 National Landscapes.
- The zone has a rich terrestrial and marine **biodiversity** resource; a significant proportion of the South West's coastline is international and nationally designated for its biodiversity value.
- **10 waterbodies** in Zone T12 are classified as having a **'bad' ecological status**.
- Parts of the zone are at significant risk of fluvial **flooding**, including the River Severn catchment and the Somerset levels. There have also been significant coastal flood events in the last ten years.
- Particular challenges facing the **water environment** include climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution. Bathing water quality has also been an increasing issue in the zone over the last five years.

17. Zone T13: Wales

Overview of Zone T13

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

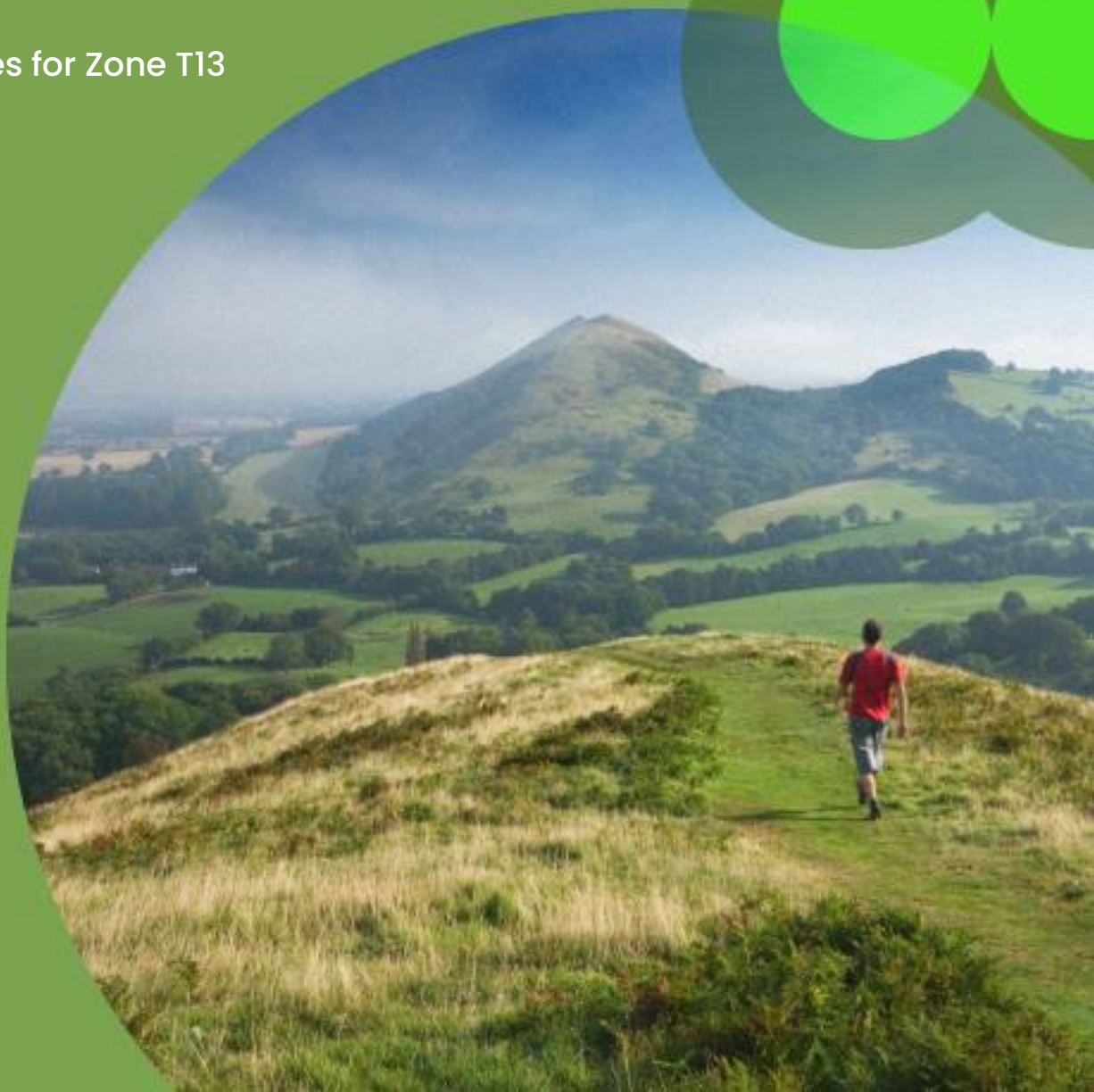
Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for Zone T13



17.1. Overview of Zone T13

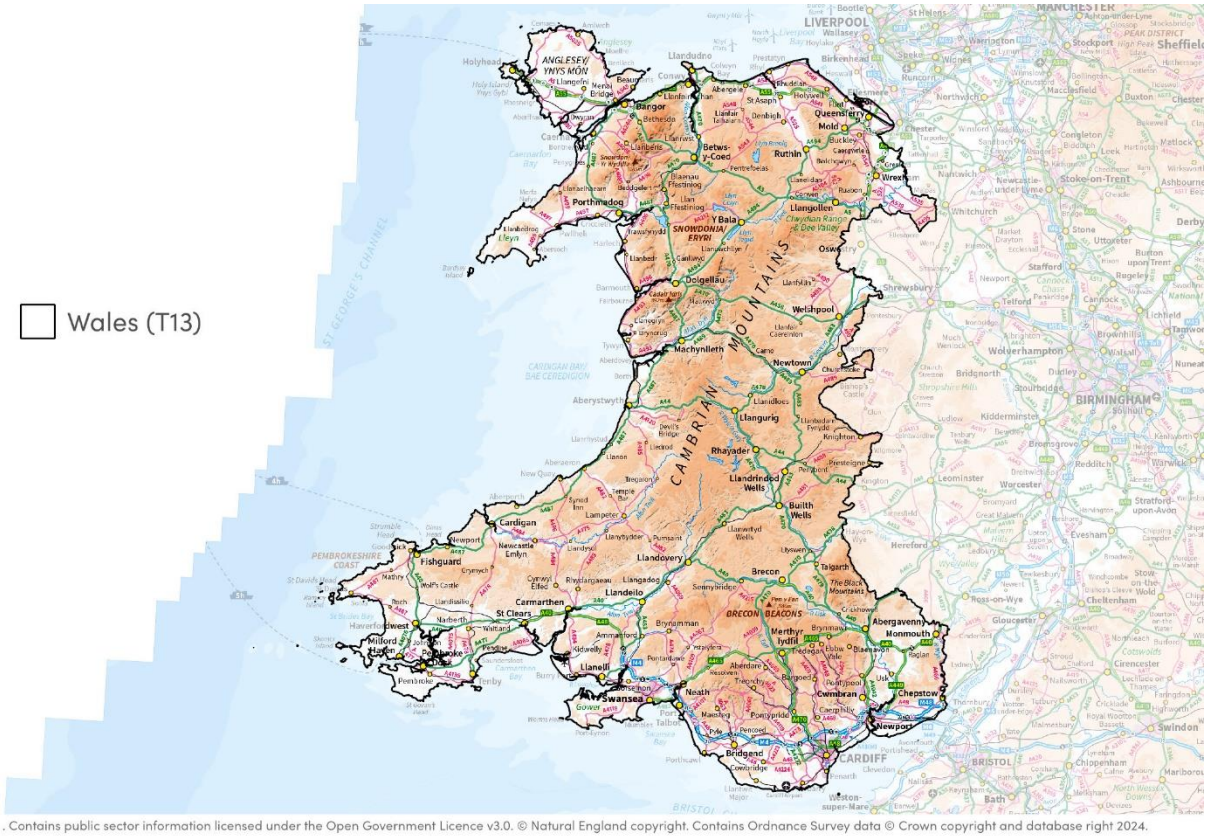


Figure 17.1: Area covered by Zone T13 – Wales

Zone T13 (as shown in Figure 17.1 above), which comprises **Wales**, covers **20,782 km²**, making up 10% of GB's land mass. It shares a 257km land border with England and has a coastline of 2,700km.

The population of Wales is **3,164,000**, and its largest urban areas are the capital city, Cardiff (population 348,535), Swansea (population 170,085) and Newport (population 130,890). The next ten largest settlements in Wales by population are Barry, Bridgend, Cwmbran, Wrexham, Llanelli, Neath, Merthyr Tydfil, Aberdare, Caerphilly and Pontypridd.

Whilst these urban areas play a key role, only 8-10% of Wales is built-up; the predominantly rural country is comprised of significant areas of hilly and mountainous topography, interspersed with rural settlements.

Wales is recognised for its high-quality landscapes and seascapes, including three National Parks (for their distinctive characteristics of mountainous, hilly and coastal landscapes) and five National Landscapes. The country has a rich historic environment, retaining elements of the landscape and built environment which relate to its past, particularly its defensive and ecclesiastical heritage and its role in mining and the industrial revolution. Linked to this diverse historic environment, the rich cultural heritage

of Wales is central to Welsh identity, and incorporates the Welsh language, cultural practices, place names, mythology/folklore, customs and traditions.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

17.2. Air quality

Air quality issues in Wales are largely associated with traffic and transport. As highlighted by the location of the **44 AQMAs**, air quality concerns are largely focused within the southern part of the zone – particularly Cardiff, Newport and the Welsh valleys (see Figure 17.2 below). AQMAs within this zone are primarily designated for exceedances in the annual mean concentration objective of 40µg/m^3 for NO_2, though the **Port Talbot AQMA** (**1**) is designated for exceedances in the 24 hour mean concentration of 50µg/m^3 for PM_{10}, which is largely linked to industrial activity in the area[167].

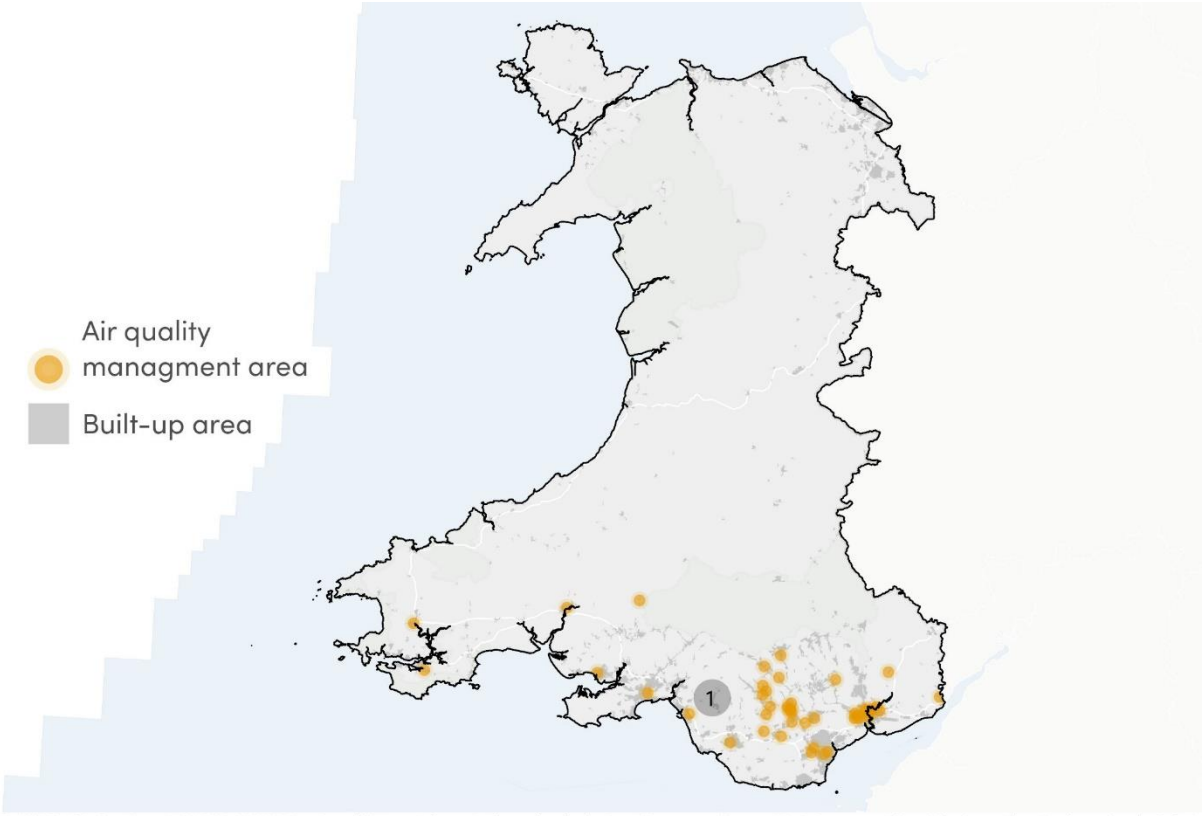


Figure 17.2: AQMAs in Zone T13

17.3. Climate change

In Wales, total GHG emissions came to **26,835.8 kt CO_2e** in 2022. Of this, the **transport sector** is responsible for approx. 21.9% of emissions; the agricultural sector is responsible for approx. 20.3%, and the domestic sector approx. 16%.[168]

[167] Welsh Government (no date): Air pollution data in Port Talbot
[168] UK Government (2022): UK local authority and regional greenhouse gas emissions statistics

The **land use, land use change and forestry sector** contributed to removing 678.8 kt CO_2e in this zone in 2022. As such, it is considered that Wales has a good level of **carbon storage**. This is largely linked to peatland in Wales, especially in the north-west (associated with Eryri National Park / Snowdonia), the south (associated with Bannau Brycheiniog National Park / Brecon Beacons), and the Cambrian Mountains. The importance of peatland is recognised by the Welsh Government, which has been working under the National Peatland Action Programme to restore and safeguard peatland areas. Across 2023/24, restoration activity occurred over 3,193 hectares of land[169].

Primary impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections (UKCP18)[170], winters in this zone are anticipated to be 1.17°C warmer between 2021-2040 and 2.89°C warmer between 2061-2080 in comparison to 1981-2000 (3.99°C). Warmer summers are also anticipated - with a 1.93°C increase anticipated for 2021-2040, and a 4.68°C increase for 2061-2080 in comparison to 1981-2000 (13.9°C). Winters in this zone are anticipated to be wetter (increasing to 7.25mm/day in 2061-2080 in comparison to 6.03mm/day in 1981-2000), and drier in the summer (decreasing to 1.94mm/day in 2061-2080 in comparison to 3.08mm/day in 1981-2000)[171]. Wales is at risk of significant coastal change, which is likely to be exacerbated by climate change.

Secondary impacts from climate change are largely linked to changes in temperature, humidity and precipitation. These can be widespread and impact upon ecosystems, people, settlements and infrastructure. Changes in precipitation patterns can lead to an increase in flood events or the occurrence of drought, which can impact on agriculture and natural resources. Increased temperatures can also result in heat-related human mortality, and cause species loss. Additionally, higher temperatures and the occurrence of heatwaves can aggravate air pollution events and also limit the function of key infrastructure – including compromising energy systems. The Intergovernmental Panel on Climate Change (IPCC) outlines that the energy sector is climate-exposed, indicating that energy infrastructure will become increasingly vulnerable if design standards do not account for changing climate conditions[172]. Infrastructure resilience, reliable power systems and efficient water use for existing and new energy generation systems are viewed as the most feasible adaptation techniques – alongside energy generation diversification (i.e., a greater use of renewable energy)[173].

17.4. Community wellbeing

The population of Wales is **3,107,494** (ONS Census 2021). Whilst there are a number of significant urban areas, overall Wales has a low population density of 149.9 residents per

[169] Natural Resources Wales (2024): National Peatland Action Programme: Year 4 Report
[170] Met Office (no date): UKCP data
[171] Based on the RCP8.5 emissions scenario, which assumes there is fast population growth, low technical development rate, slow GDP growth, a massive increase in world poverty and high energy use and emissions. It also assumes no climate change mitigation or adaptation techniques are engaged with.
[172] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[173] IPCC (2019): Climate Change and Land

square km, with some of the lowest population densities in Powys and Ceredigion. South Wales has a higher population than elsewhere in the zone.

In terms of its age profile, Zone T13 has a higher percentage of people of **retirement age** and above, at 21.4% (see Figure 17.3 overleaf). This age profile pattern is likely to persist in the medium term, as the country has a large proportion (20.5%) of people aged 50 to 64 (ONS Census 2021). The proportion of people aged 15 and under is 17.7% and 61% of the Welsh population is of working age.

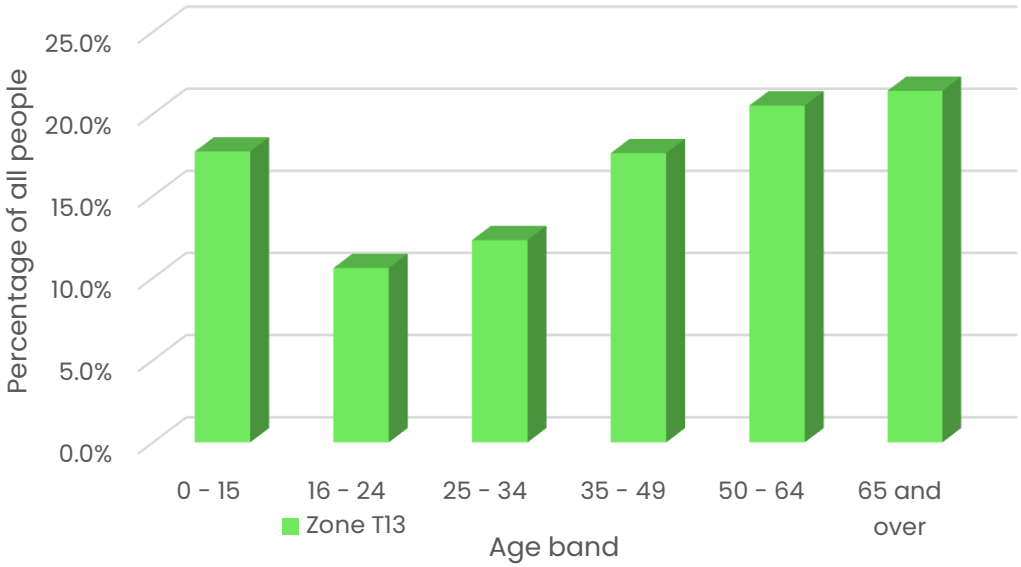


Figure 17.3: Age profile of Zone T13 (source ONS Census 2021)

IMD data from 2019 shows that Wales includes areas with **high levels of deprivation**. These are largely located in the former industrial and mining areas of south Wales and north east Wales, as well as in Cardiff, Swansea / Port Talbot, Newport and a number of seaside towns.

The ten most deprived areas in Wales can be found in Rhyl, Caerphilly, Rhondda Cynon Taf, Merthyr Tydfil, Wrexham, Bridgend and Newport. The local authority with the highest proportion of small areas in the most deprived 10% in Wales in 2019 was Newport (24.2%). Blaenau Gwent had the highest percentage of areas in the most deprived 50% in Wales (85.1%).[174]

Key 'traditional' economic sectors in the zone include coal mining, steel production and textile manufacturing. Tourism provides a significant seasonal contribution to the coastline, Bannau Brycheiniog (Brecon Beacons), north west Wales, Pembrokeshire and the Wye Valley. Agriculture is also a major economic activity in the central and eastern areas of the zone. Current sectors in Cardiff and other major Welsh cities include professional services, retail and hospitality and growing creative industries, IT and digital sectors. In recent years, Wales has also seen an increase in renewable energy generation and offers significant economic opportunities in this sector.

[174] Welsh Government (2019): Welsh Index of Multiple Deprivation (WIMD) 2019 Results Report

In Zone T13, the industries with the **highest regional GVA in 2022**[175] were the services sector and production sector.

Wales is served by a comprehensive **rights of way network**, much of which provides nature-based recreation and leisure opportunities popular with locals and tourists. This includes the Wales Coast Path, which runs largely uninterrupted along the national coastline. Other National Trails and long-distance routes include the Pembrokeshire Coast Path National Trail, Offa's Dyke Path National Trail, Glyndŵr's Way National Trail, North Wales Pilgrim's Way and The Taith Cambria.

17.5. Cultural heritage and historic environment

The **historic environment** and cultural heritage of Wales is defined by its rich and diverse history and historic evolution. This includes relating to:

- The settlement of Neanderthals around 230,000 years ago and subsequent arrival of Homo Sapians about 31,000 BC.
- Wales' wealth of Mesolithic, Neolithic, and Bronze Age burial and ceremonial monuments and its contribution as a key source of copper during the Bronze Age.
- The development of the Iron Age Celtic culture and the proliferation of Iron Age hillforts from around 800 BCE onwards.
- The encroachment by Germanic Anglo-Saxon settlers from the east, and the development of kingdoms and the Welsh identity.
- The conquests of Edward I and rebellions; Union with England in 1536 and the creation of the Kingdom of GB in 1707.
- The rapid industrialisation and urbanisation of the industrial revolution of the 18th and 19th centuries.
- Cultural revival, a strengthening of political culture, a renewed interest in Welsh language and literature and the emergence of strong national identity in the 19th and 20th centuries.
- Decline in several of the traditional industries, in particular the coal industry following WWII and economic reconfiguration.
- Devolution in the late 20th century.

[175] ONS (2024): Regional gross value added (balanced) by industry: all ITL regions

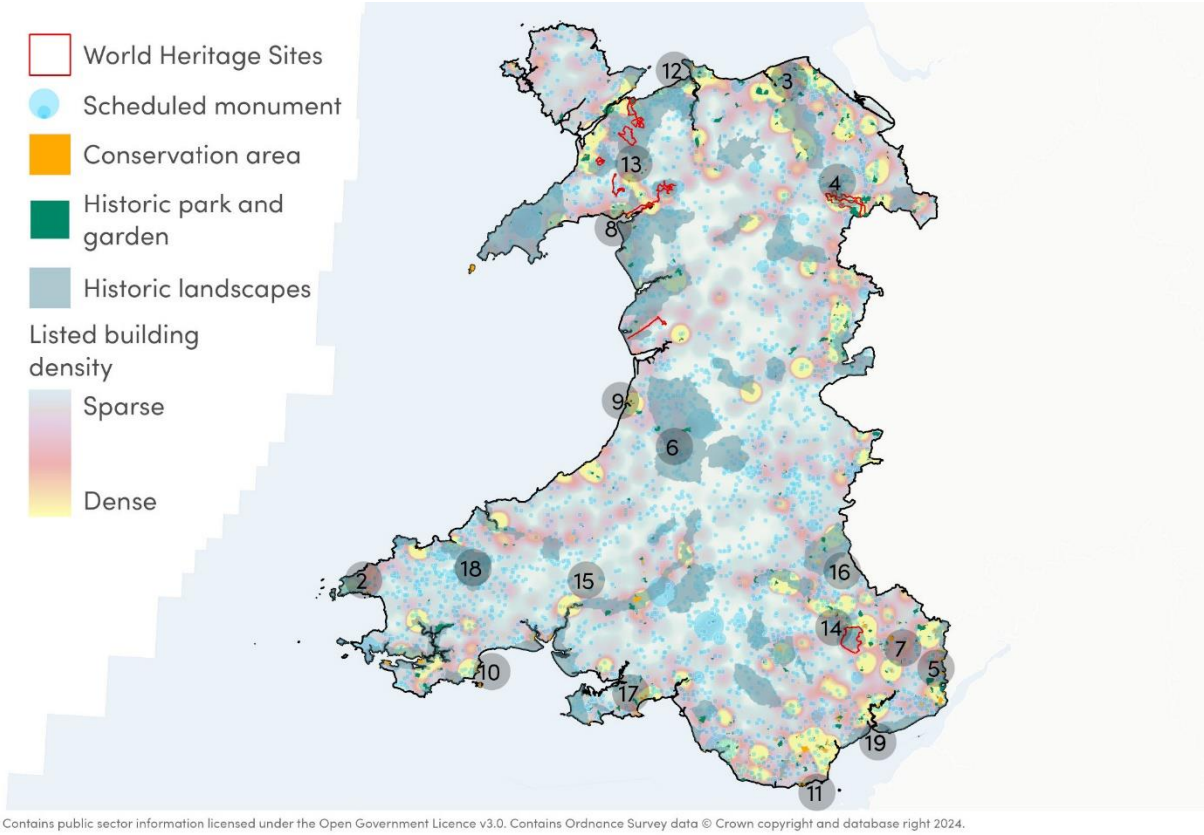


Figure 17.4: Designated heritage assets within Zone T13

Key features of Wales's historic environment (see Figure 17.4 above) include:

- **Neolithic, Bronze Age and Iron Age structures**: Wales has a wealth of archaeological finds from the Neolithic and Bronze Age, dating from 8,000–800 BCE. In addition there are numerous Iron Age hillforts dating from 800 BCE. These are discussed in more detail below under archaeology.
- **Medieval defensive structures**: These include the Edward I era castles of Conwy, Beaumaris, Caernarfon and Harlech in north Wales; Denbigh Castle in Denbighshire; Caerphilly Castle and Raglan Castle in south Wales; the castles of the Welsh princes such as Castell Dolwyddelan, Castell Dolbardarn and Castell Cricieth; Kidwelly Castle in Carmarthanshire; Pembrokeshire's coastal fortifications; and Offa's Dyke on the border with England.
- **Concentrations of industrial heritage**: Wales has a rich industrial heritage associated with the role of the industrial revolution in the 18th and 19th century. This includes as associated with north east Wales' (including Holywell Buckley and Mold's) role in the early industrial revolution in the 18th century; the South Wales Coalfield including the Rhondda Valley; Merthyr Tydfil's role as the 'iron capital of the world'; copper production in Glamorgan; the major industrial ports of Cardiff and Swansea; Wrexham and the Clywedog Valley, associated with coal and lead mining, iron and steel production, and brick and tile making; the slate industry of north west Wales; and the lead mines of mid-Wales. The fruits of the industrial revolution also manifested itself through the construction of significant castellated mansions in the

19th century, including Cyfarthfa Castle in Merthyr Tydfil, the Gothic revival Castell Coch near Cardiff and Penrhyn Castle near Bangor.

- **Religious heritage:** These include great cathedrals at St David's (**2**) and St Asaph's (**3**), the important rural monastic complexes of Valle Crucis (**4**), Tintern Abbey (**5**) and Strata Florida (**6**), and urban friaries such as that at Denbigh. It also includes the numerous important churches found across Wales, nonconformist chapels and the places of worship of other faiths.
- **Agricultural heritage**: There are concentrations of heritage assets in the areas of Wales with more productive agricultural land (where arable farming and horticulture are possible). This includes in locations with a richer agricultural heritage such as Monmouthshire (**7**) and south eastern Wales, the Welsh Marches (**5**), the northeastern part of the country, the coastal fringes and larger river valleys.
- **Coastal communities with seaside heritage**: Such as Rhyl (**3**), Llandudno, Bangor, Beaumaris, Aberdaron, Abersoch, Portmeirion (**8**), Barmouth, Aberystwyth (**9**), Aberaeron, New Quay, Tenby (**10**), Porthcawl and Barry (**11**).

Reflecting a number of these key features, there are four World Heritage Sites in Wales, as follows:

- **Castles and Town Walls of King Edward in Gwynedd**: The castles of Beaumaris and Harlech and the fortified complexes of Caernarfon and Conwy (**12**) are located in the former principality of Gwynedd, in north Wales. These extremely well-preserved monuments are examples of the colonization and defence works carried out throughout the reign of Edward I (1272–1307) and the military architecture of the time. The four castles of Beaumaris, Conwy, Caernarfon, Harlech and the attendant fortified towns at Conwy and Caernarfon are the finest examples of late 13th century and early 14th century military architecture in Europe, as demonstrated through their completeness, pristine state, evidence for organized domestic space, and extraordinary repertory of their medieval architectural form.
- **Pontcysyllte Aqueduct and Canal** (**4**): Situated in north-eastern Wales, the 18 km long Pontcysyllte Aqueduct and Canal is a feat of civil engineering of the Industrial Revolution, completed in the early years of the 19th century. Covering a difficult geographical setting, the building of the canal required substantial, bold civil engineering solutions, especially as it was built without using locks. The Pontcysyllte Aqueduct and Canal are early and outstanding examples of the innovations brought about by the Industrial Revolution in Britain, where they made decisive development in transport capacities possible. They bear witness to very substantial international interchanges and influences in the fields of inland waterways, civil engineering, land-use planning, and the application of iron in structural design.
- **The Slate Landscape of Northwest Wales** (**13**): The WHS illustrates the transformation that industrial slate quarrying and mining brought about in the traditional rural environment of the mountains and valleys of the Snowdon massif. Six areas together represent an exceptional example of an industrial landscape which was profoundly shaped by quarrying and mining slate and transporting it for national and international markets. From 1780 to 1940 this industry dominated world production of roofing slates, transforming both the environment and the communities who lived and worked here. The quarries and mines are monumental in scale, comprising

stepped hillside workings, deep pits and cavernous underground chambers, massive cascading tips, ingenious water systems, and a range of industrial buildings. Outstanding technical equipment and major engineering features survive. Innovative transport systems linked quarries and processing sites with purpose-built coastal export harbours and with main-line railways. Grand country houses and estates built by leading industrialists contrast with workers' vernacular settlements, with their characteristic chapels and churches, band-rooms, schools, libraries and meeting-places which retain multiple examples of their traditional way of life and strong minority language.

- **Blaenavon Industrial Landscape** (**14**): The landscape of Blaenavon, at the upper end of the Avon Llwyd valley in South Wales, provides exceptional testimony to the area's international importance in iron making and coal mining in the late 18th and the early 19th century. The parallel development of these industries was one of the principal dynamic forces of the Industrial Revolution. The major preserved sites of Blaenavon Ironworks and Big Pit, together with the outstanding relict landscape of mineral exploitation, manufacturing, transport, and settlement which surrounds them, provide an extraordinarily comprehensive picture of all the crucial elements of the industrialisation process: coal and ore mines, quarries, a primitive railway system and canal, furnaces, workers' homes, and the social infrastructure of the early industrial community.

Wales has a rich and varied **archaeological resource**. Particular concentrations of scheduled monuments include in Pembrokeshire and Carmarthenshire (**15**); the slate quarries of north west Wales including in and around Eryri National Park; Neolithic, Iron Age, Roman and early medieval remains in the Welsh Marches (**5**); Iron Age hillforts and medieval hilltop defensive fortifications in the Black Mountains (**16**); industrial heritage in the South Wales Coalfields; the Gower Peninsula's (**17**) Neolithic burial chambers, Bronze Age cairns, remains of Iron Age and medieval settlements and 16th century saltworks; the ridgelines of the Preseli Hills (**18**) in west Wales, with particular concentrations of Neolithic and Bronze Age finds including burial chambers, tumuli, hill forts, hut circles, stone circles and henges; and the lower Wye Valley, Chepstow and Newport (**19**), reflecting historic travelling routes.

A key facet of Welsh identity, which is closely linked to its historic environment, is its **intangible cultural heritage**. Intangible cultural heritage includes the practices, knowledge, and expressions that communities recognize as part of their cultural identity, along with associated objects and spaces. Transmitted through generations, this heritage adapts over time, reinforcing identity and respect for cultural diversity. In this respect the intangible cultural heritage of Wales is central to Welsh identity, and incorporates its language, cultural practices, place names, mythology/folklore, customs and traditions.

17.6. Ecology and biodiversity

Priority habitats are present across Wales and represent a diverse range of habitats and support a wide variety of species. Particularly extensive areas of priority habitat are shown in Figure 17.5 below, and include:

- Upland heathland in Eryri / Snowdonia National Park (**20**)

- Upland heathland and blanket bog in the Berwyn a Mynyddoedd De Clwyd / Berwyn and South Clwyd Mountains (**21**)
- Blanket bog, upland flushes, fens and swamps, and upland heathland in Elenydd – Mallaen (**22**)
- Upland heathland is the Bannau Brycheiniog / Brecon Beacons National Park (**23**)
- Upland heathland, lowland dry acid grassland, and purple moor grass and rush pastures in the Preseli Hills (**24**)

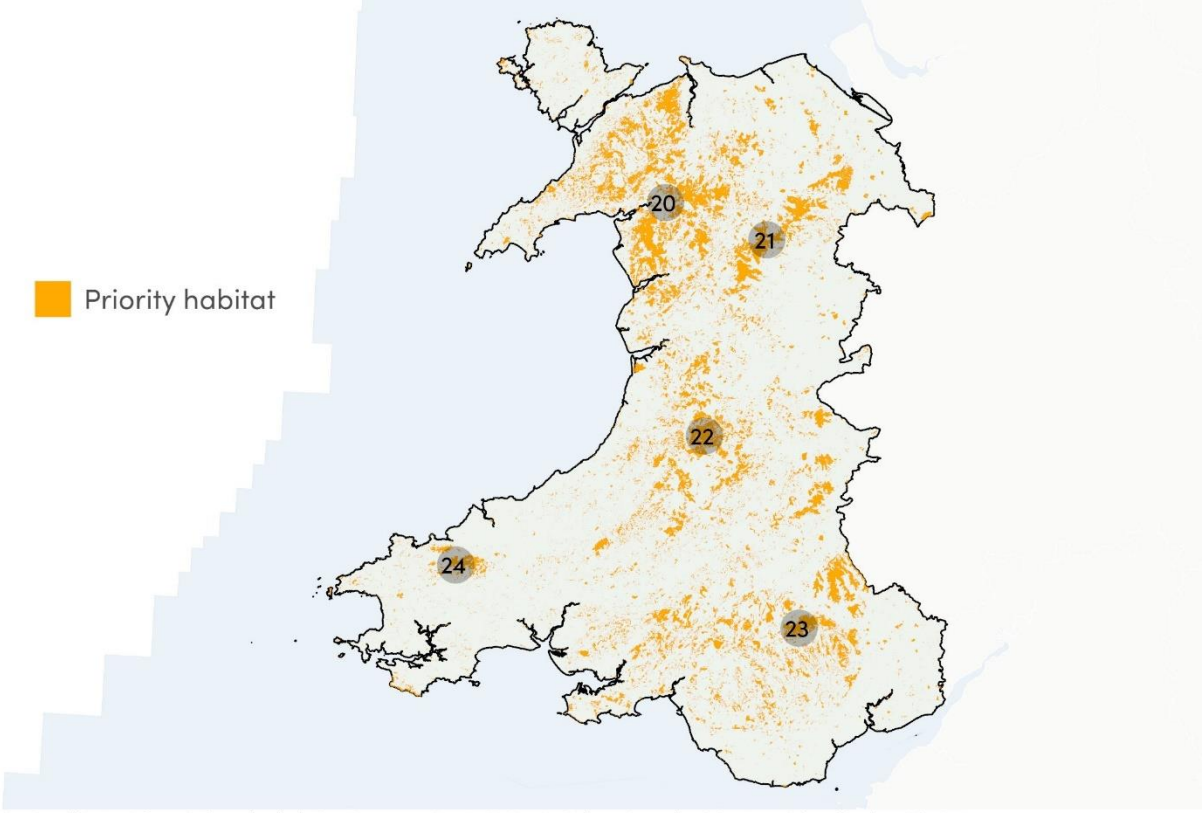


Figure 17.5: Cover of priority habitats in Zone T13

Overall, the area covered by **SAC** designations (including possible SACs) is 126,949 ha (6.1% of the zone); the area covered by **SPA** designations (including potential SPAs) is 82,444 ha (3.97% of the zone); and the area covered by **Ramsar site** designations (including proposed Ramsar sites) is 7,820 ha (0.37% of the zone). Internationally designated sites for biodiversity in the zone, as shown in Figure 17.6 overleaf, include:

- Eryri / Snowdonia SAC (**25**)
- Migneint-Arenig-Dduallt SAC and SPA (**26**)
- Berwyn a Mynyddoedd De Clwyd / Berwyn and South Clwyd Mountains SAC and SPA (**27**)
- Elenydd – Mallaen SAC and SPA (**28**)

The area covered by **SSSI** designations is 220,327 ha (10.6% of the zone). Nationally designated sites for biodiversity in the zone, as shown in Figure 17.6 overleaf, include:

- Eryri SSSI (**25**)

- Migneint-Arenig-Dduallt SSSI (**26**)
- Berwyn SSSI (**27**)
- Elenydd SSSI (**28**)
- Mynydd Du (Black Mountain) SSSI (**29**)
- Brecon Beacons SSSI (**30**)
- Black Mountains SSSI (**31**)
- Gwent Levels SSSI (**32**)
- Pumlumon (Plynlimon) SSSI (**33**)
- Mynydd Hiraethog SSSI (**34**)

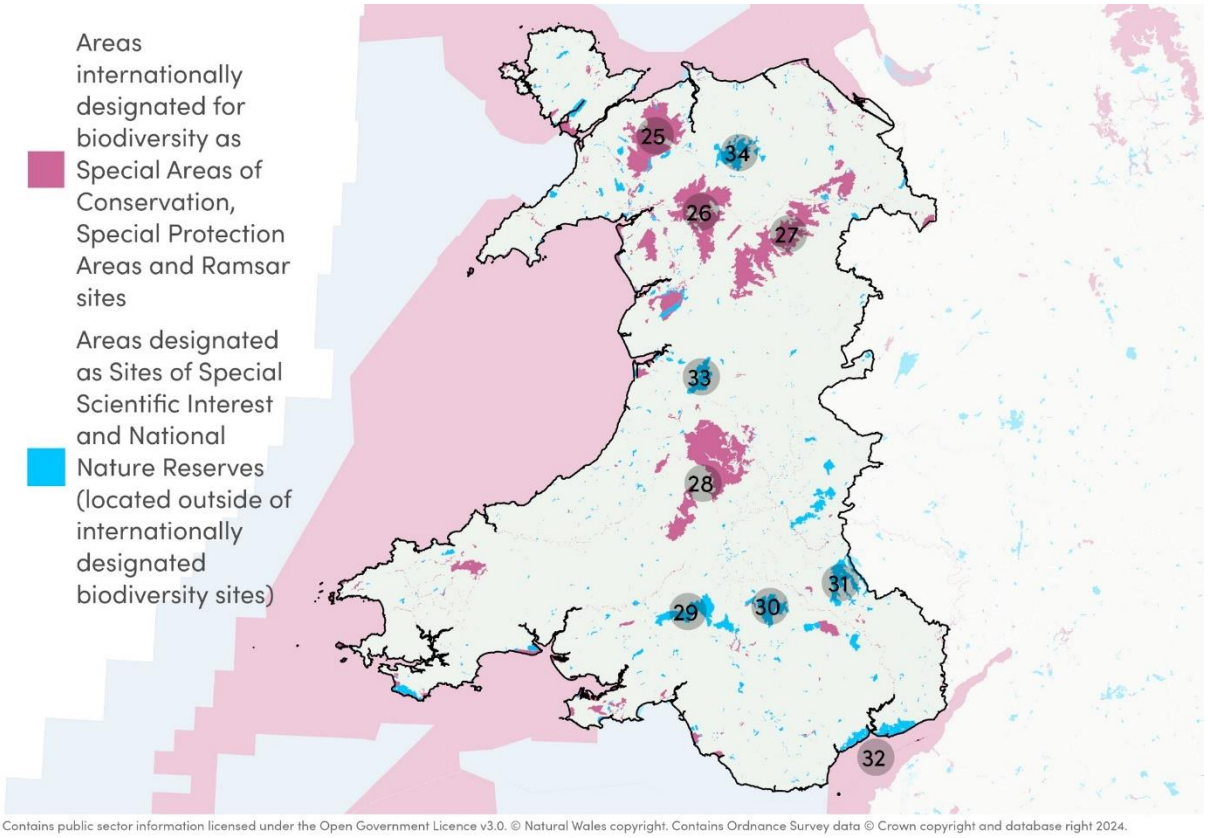


Figure 17.6: Internationally and nationally designated sites for biodiversity in Zone T13

The percentage of the zone covered by **ancient woodland** is 4.6%, totalling 94,952 ha.

17.7. Land and soil resources

As shown in Figure 17.7 overleaf, Wales's topography, geological composition and geomorphology means that large swathes of north, central and south Wales comprise **poorer quality** agricultural land. Many of the poorer quality areas are associated with the elevated land of the **Cambrian Mountains** which run in a central column through Wales.

Areas of **BMV** agricultural land are generally grades 2 and 3a, and are associated with lower elevations across the country, with much of it found surrounding river valleys and flood plains. Particular concentrations of **grades 2 and 3a** land can be found on Anglesey (**35**), on the Llyn Peninsula (**36**), surrounding the River Clwyd (**37**), the River Dee (**38**), the

River Severn (**39**), Monmouthshire (**40**), on the southern side of the Gower Peninsula (**41**) and on southern and western parts of Pembrokeshire (**42**).

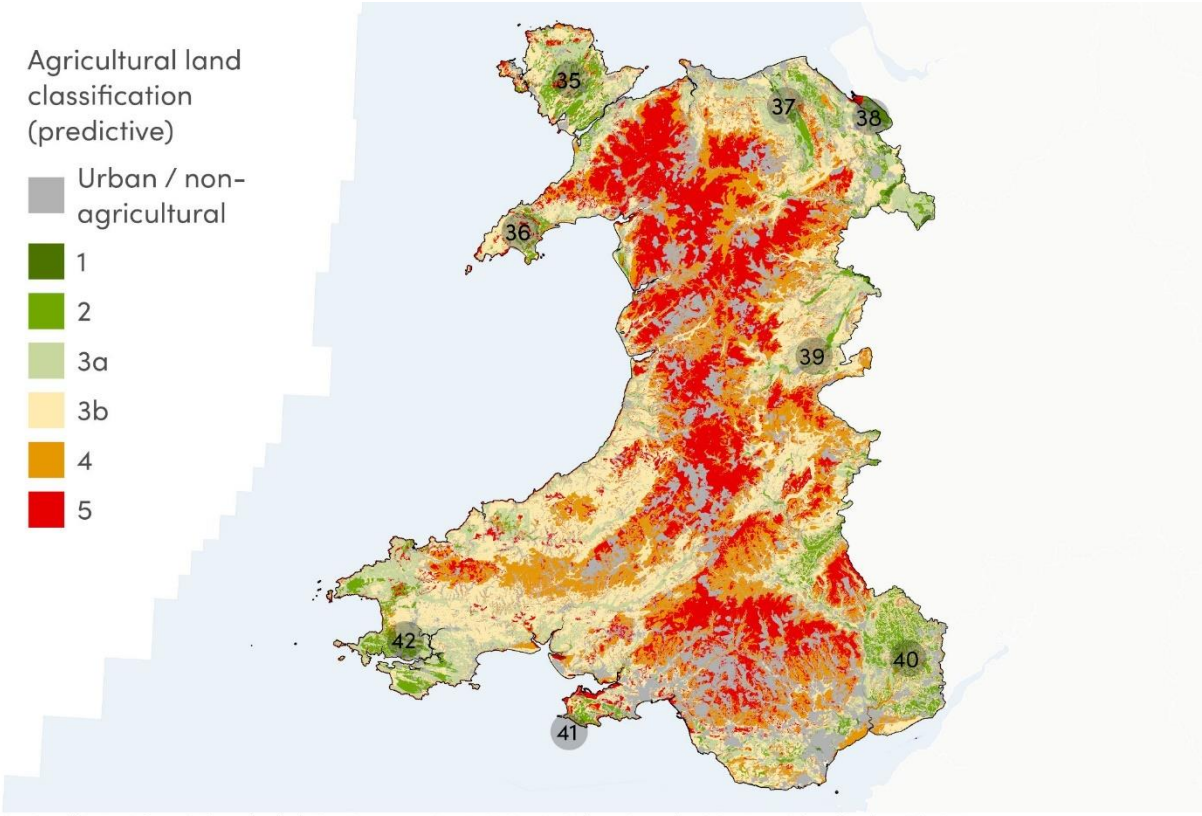


Figure 17.7: Agricultural land classification across Zone T13

17.8. Landscape and seascape

Wales has a diverse range of landscapes, representing a significant breadth of landscape and seascape types which reflect the interplay of the area's topography, geology, biodiversity, land uses and cultural heritage. The landscape character of Wales is closely influenced by its historic evolution; this is discussed in more detail under 'cultural heritage and historic environment' theme.

Much of Wales landscape character is heavily influenced by **uplands**. These include: Eryri (Snowdonia) in the north west; the Cambrian Mountains, which run in a north-south direction through the central spine of the country; the Black Mountains and Bannau Brycheiniog (Brecon Beacons) in the south; and the Preseli Hills in West Wales.

The coastline of Wales is diverse and includes the valued landscapes and seascapes of the Anglesey coast, the Llŷn Peninsula, Pembrokeshire and the Gower Peninsula. North Wales is rich in **historical sites** which form a key part of the historic landscape and seascape of the area. To the west, the coastline stretches along the Irish Sea, featuring a seascape with **cliffs**, **sandy bays**, and **harbours**.

The south east of Wales (including Monmouthshire), the Welsh Marches and north east Wales have a strong **agricultural influence**, reflecting the areas where arable farming and horticulture are possible.

To the south, the landscape transitions to more **urbanised areas**, including Cardiff and Swansea. The industrial legacy of **coal mining** and **slate quarrying** has profoundly shaped large areas of this part of the zone's landscape, with their influence particularly marked in the southern regions surrounding the urban centres.

A significant proportion of Zone T13 (24.3%) is covered by National Park or National Landscape status: the percent of the zone covered by National Parks is 19.5% (405,950 ha); and the percent covered by National Landscapes is 4.8% (99,905 ha).

Eryri (Snowdonia) is an upland National Park located in North Wales (see Figure 17.8 overleaf). Its special qualities include rugged mountains and glacially sculpted valleys; lakes; ancient woodlands; dark skies and tranquillity; an extensive network of public rights of way; traditional farming practices; and many historic buildings and structures.

Bannau Brycheiniog (Brecon Beacons) is an upland National Park located in South Wales (see Figure 17.8 overleaf). Its special qualities include gorges and waterfalls; karst geology with caves and sinkholes; glacial landforms such as cliffs and broad valleys; dark skies and tranquillity; an extensive network of public rights of way; traditional farming practices; many historic buildings and structures.

Pembrokeshire Coast is a coastal National Park located in South West Wales (see Figure 17.8 overleaf). Its special qualities include rugged cliffs and sandy beaches; wooded estuaries; wild hills; tranquillity; an extensive network of public rights of way; traditional land and water management practices; and many historic buildings and structures.

Natural Resources Wales, under the direction of the Welsh Government, is working to establish a **new national park** in north-east Wales. The proposed National Park would include the Clwydian Range and Dee Valley Area National Landscape, and would also extend further south, encompassing notable sites such as the Ceiriog Valley and Lake Vyrnwy. Public consultations on the proposal closed in December 2024. If designated, the National Park would cover a significant amount of the land within Zone T13.

Five National Landscapes are located wholly or partly within Zone T13 (see Figure 17.8 overleaf). These range from the coastal landscapes and seascapes of **Gower**, **Llŷn Peninsula**, and **Ynys Mon / Anglesey** to the inland landscapes of **Clwydian Range and Dee Valley** and **Wye Valley**.

Heritage coasts have been established to conserve the best stretches of undeveloped coast in England and Wales. Reflecting Zone T13's distinctive seascapes, around a third of its coastline is covered by heritage coast.

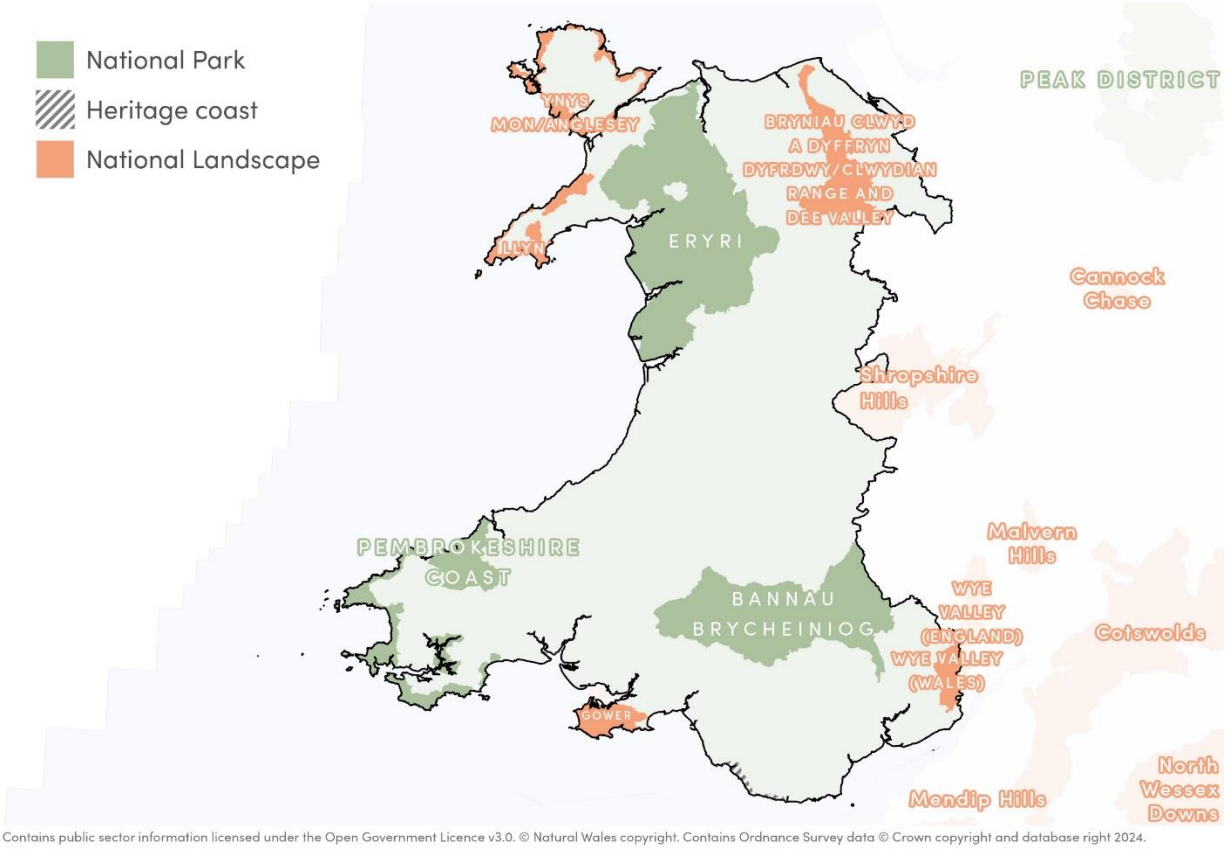


Figure 17.8: Designated landscapes within Zone T13

17.9. Water

According to the latest round of WFD assessments in Wales in 2021, **44% of waterbodies** in Zone T13 achieved **at least 'good' ecological status**.[176] This rises to 44% when looking at Welsh rivers in isolation. In addition, for chemical assessment, surface waterbodies achieved a 94% success rate for good status.

The National Flood Risk Management Plan[177] highlights **nine FRAs** for significant risk of flooding from either **main rivers and the sea**, **surface water**, **reservoirs**, **ordinary watercourses**, or **groundwater**. These are the North Wales Coast, Flintshire, Wrexham, Gwynedd, Monmouthshire, Newport, Cardiff, the South Wales Valleys, and Swansea Bay.

[176] Afonydd Cymru (2021): Water Framework Directive Assessments in Wales
[177] Natural Resources Wales (2023): National Flood Risk Management Plan

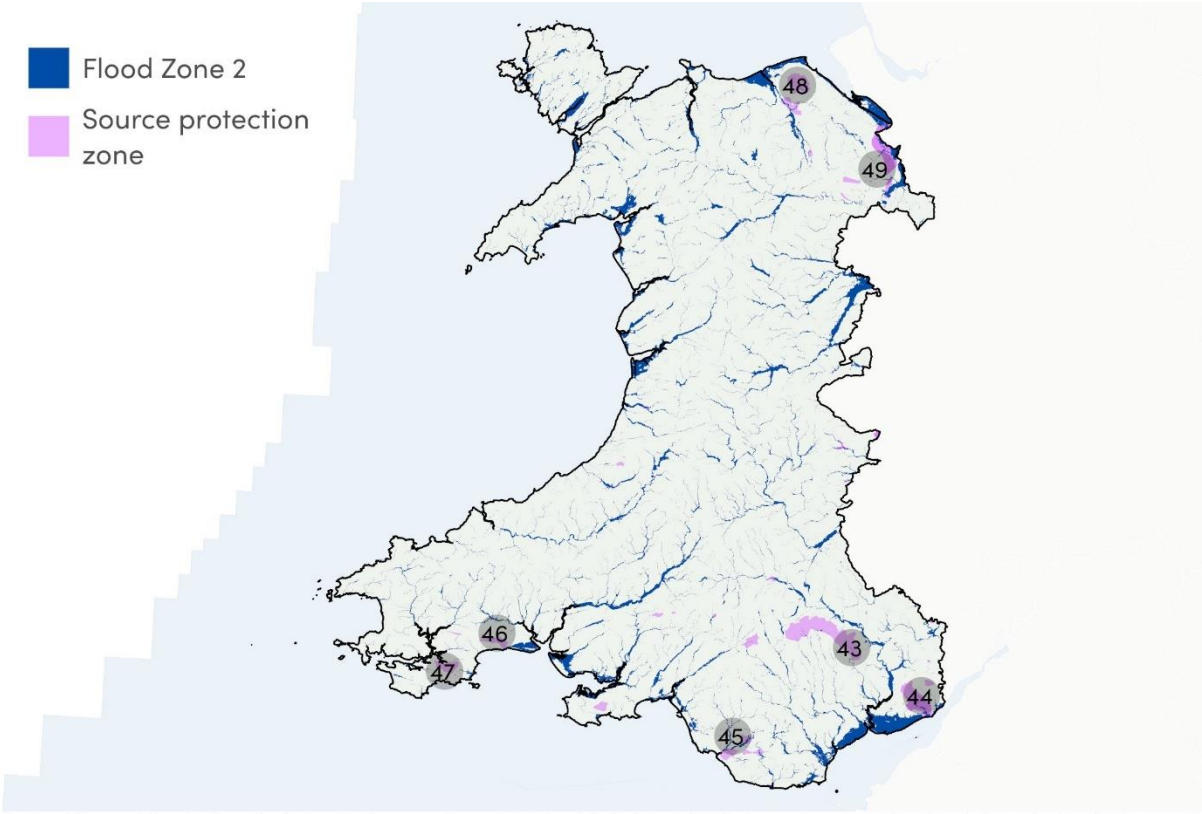


Figure 17.9: Areas of Flood Zone 2 and SPZs and NVZs within Zone T13

As shown in Figure 17.9 above, **SPZs** are mostly present in the vicinity of Blaenavon (**43**), Caldicot (**44**), Bridgend (**45**), Pentywyn / Pendine (**46**), Caeriw / Carew (**47**), Llanelwy / St Asaph (**48**), and Wrexham (**49**).

As highlighted in the National Flood Risk Management Plan, climate projections indicate that Wales will see an increase in the frequency and intensity of **extreme weather events**, including storm events in the summer and prolonger wet periods during the winter period. This will increase peak flows in Welsh rivers, which is expected to increase the risk of flash **flooding** events. Climate projections also indicate that **sea level rise** will occur for all emissions scenarios at all locations around the UK. Coastal areas will be increasingly vulnerable to increased **wave action** and accelerated **coastal erosion** associated with climate change. These impacts will affect not only coastal communities who live and work in coastal areas, but some of Wales's most important natural habitats and heritage sites which are located along the Welsh coastline.

17.10. Key issues for Zone T13

The following key issues have been identified through the review of the baseline information for Zone T13:

- Wales has significant opportunities for **carbon storage**. This is largely linked to the presence of peatland, especially in the north-west (associated with Eryri National Park / Snowdonia), the south (associated with Bannau Brycheiniog National Park / Brecon Beacons), and the Cambrian Mountains.

- Climate projections indicate that Wales will see an increase in the frequency and intensity of **extreme weather events**, including storm events in the summer and prolonged wet periods during the winter period. This will increase peak flows in Welsh rivers, which is expected to increase the risk of flash flooding events. Climate projections also indicate that sea level rise will occur for all emissions scenarios at all locations around the UK. Coastal areas will be increasingly vulnerable to increased wave action and accelerated coastal erosion associated with climate change. These impacts will affect not only coastal communities who live and work in coastal areas, but some of Wales's most important natural habitats and heritage sites which are located along the Welsh coastline.
- Wales has an **ageing population** with a higher percentage of people of retirement age and above.
- Wales includes areas with **high levels of deprivation**. These are largely located in the former industrial and mining areas of south Wales and north east Wales, as well as in Cardiff, Swansea, Newport and a number of seaside towns. The ten most deprived areas in Wales can be found in Rhyl, Caerphilly, Rhondda Cynon Taf, Merthyr Tydfil, Wrexham, Bridgend and Newport.
- In recent years, Wales has seen an increase in **renewable energy generation** and offers significant economic opportunities in this sector.
- Wales has a diverse **historic environment**, with particularly rich prehistoric, defensive, ecclesiastical, industrial and seaside heritage.
- Wales has a rich **archaeological resource**, including associated with the Neolithic, Bronze Age and Iron Age periods, as well as medieval and industrial archaeology.
- Four World Heritage Sites have been inscribed by UNESCO in Wales: the Castles and Town Walls of King Edward in Gwynedd; the Pontcysyllte Aqueduct and Canal; the Slate Landscape of Northwest Wales; and the Blaenavon Industrial Landscape.
- Wales has a rich and diverse landscape and seaside character. Wales currently has three **National Parks**, Eryri (Snowdonia), Bannau Brycheiniog (Brecon Beacons) and the Pembrokeshire Coast. Natural Resources Wales, under the direction of the Welsh Government, is currently working to establish a new national park in north-east Wales.
- A significant proportion of Wales' coastline is designated for its **biodiversity** value.
- Areas of the **best and most versatile** agricultural land in Wales are largely limited to Anglesey, the Llyn Peninsula, Monmouthshire, the Gower Peninsula, Pembrokeshire and surrounding the River Clwyd, the River Dee and the River Severn.
- Since 2015, several significant and prolonged **flood events** have affected Wales. Fluvial, surface water and coastal flood risk is likely to become an increasing issue with climate change.

18. Zone M1: West Scotland

Overview of Zone M1

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for M1

18.1. Overview of Zone M1

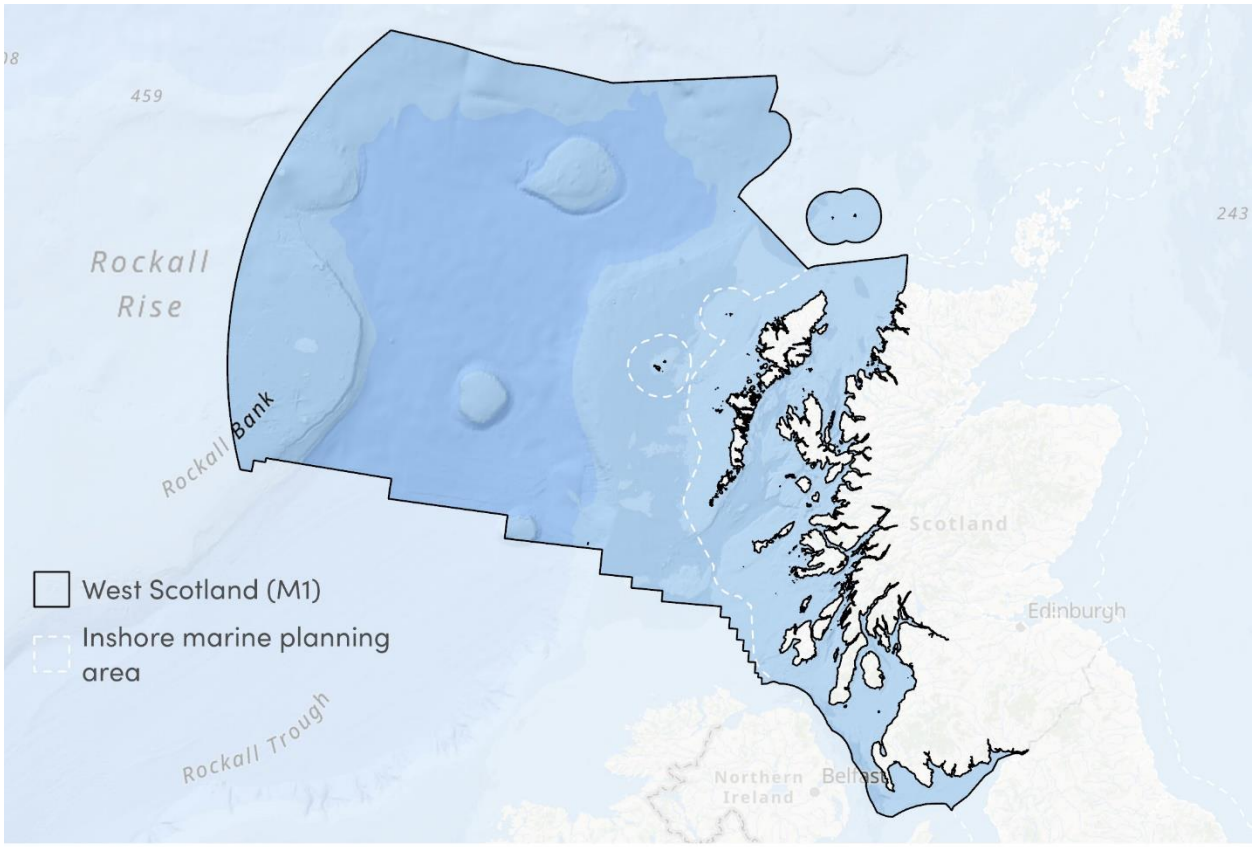


Figure 18.1: Area covered by Zone M1 – West Scotland

Zone M1 covers the marine area surrounding the west coast of Scotland. It includes the Scottish Marine Regions of Outer Hebrides, Argyll, Solway, Clyde, and West Highlands, as well as the Offshore Marine Regions of Hebrides Shelf, Bailey, and Rockall.

Zone M1 incorporates the marine area up to spring high tides along the western mainland of Scotland, stretching from the Solway Firth at the Scottish-English border in the south to Cape Wrath in the north (see Figure 18.1 above). It also includes the coastlines surrounding the many islands of the Inner and Outer Hebrides, located west of the mainland. Additionally, the zone covers extensive areas of the Atlantic Ocean, extending approximately 500 km west of mainland Scotland.

The zone overlaps with seven council areas, Loch Lomond and The Trossachs National Park, and 25 National Scenic Areas. A proposed new National Park in Galloway is also likely to overlap with areas in Zone M1, if designated.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

18.2. Air quality

No significant air quality issues affect Zone M1. Port activities and ship-source pollutants can be an issue in some port locations, including relating to NOx, SOx and PM_{10}. However, these are relatively insignificant; none of the main port areas are designated AQMAs due to port activities.

All of the Scottish Environment Protection Agency's (SEPA) automatic air quality monitoring sites in the zone recorded low air pollution levels as of December 2024.[178] Additionally, all sites in SEPA's NO_2 diffusion tube network recorded levels below the annual mean objective for NO_2 in the latest year of monitoring (2023).

18.3. Climate change

Impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projects, in Scotland winters in the 2070s (2061-2080) could be up to 2.8°C warmer and 12% wetter, with summers up to 4°C hotter and 17% drier. In terms of the warming of the sea, data indicates there has been a sea surface temperature increase of approximately 0.3°C per decade for the last 40 years around the UK[179].

Mean sea level rise around the UK has been between 12-16cm since 1900[180] and sea level projections to 2300 suggest that UK sea levels will continue to rise over the coming centuries under all RCP climate change scenarios. As highlighted by the Met Office, the UK is locked into accelerated sea level rise over this timeframe regardless of trends in greenhouse gas emissions[181].

UK tide gauge records show substantial year to year changes in coastal water levels[182]. Marine data recorded by the **Stornoway tidal gauge** indicates that the sea level is expected to rise in this zone by **0.46m by 2100**[183], relative to the 1981-2000 average[184]. This is based on the RCP4.5 emissions scenario[185]; it is noted that projections of sea level change around the UK can vary substantially by climate change scenario. It is noted that mean sea level rise in Scotland is anticipated to be lower than that in the southern extent

[178] Air Quality in Scotland (2025): Latest pollution map
[179] Horsburgh, K. et al. (2023): New report predicts UK oceans to warm by more than three degrees by 2100
[180] Marine Climate Change Impacts Partnership (2020): Impacts of climate change on sea-level rise relevant to the coastal and marine environment around the UK
[181] Met Office (2019): UK sea level projections to 2300
[182] Met Office (2018): UKCP18 Marine report
[183] This is the 50th percentile figure and has been selected as it is a stable measurement to evaluate long-term trends.
[184] Met Office (no date): UKCP data
[185] RCP4.5 assumes that global emissions peak around 2040 and then decline, leading to a moderate level of climate change. To achieve this emissions scenario, global climate policies focused on reducing greenhouse gas emissions through technological innovation and sustainable practices will be required. RCP4.5 is often used in climate modelling to assess future climate impacts and to guide policy decisions.

of the UK, due to differences in vertical land movement – parts of Scotland are rising, and parts of southern England are sinking due to isostatic uplift.

In addition to sea level rise, climate change has resulted in further impacts to ocean systems that have caused irreversible losses in coastal and open ocean marine ecosystems[186]. The ocean acts as a carbon sink; a natural reservoir that absorbs the atmosphere's carbon through physical and biological means. It is estimated that the ocean absorbs approximately 30% of carbon dioxide that is released into the atmosphere; when it is absorbed by seawater, a series of chemical reactions occur which result in ocean acidification[187]. Human-induced climate change has caused further ocean acidification – open ocean surface pH has declined between 0.017–0.027 pH units per decade since the last 1980s[188]. This impacts upon the ecosystems within the ocean, and can have a further impact upon food production due to changes in the distribution and abundance of fish populations. Additionally, climate change has an impact on extreme wave height (linked to coastal erosion and flooding), and marine heat-related events; it is reported that marine heatwaves have doubled in frequency, have become longer lasting, and are more intense. This results in widespread coral bleaching and reef degradation[189] - which can further impact upon the loss of marine biodiversity.

In terms of **climate change mitigation**, there are many onshore windfarms in the coastal parts of Zone M1. None of these are located on the mainland coast; they are primarily found along the coastline of the Outer Hebridean islands.[190] While there are currently no offshore wind farms in Zone M1, the area has been identified as having significant potential for offshore wind energy. ScotWind's latest leasing round has allocated several areas of seabed for offshore wind energy development in Scottish waters in Zone M1, including a two fixed and two floating sites.[191]

18.4. Community wellbeing

Communities along Scotland's western coastline, including the Hebrides, are deeply rooted in a **maritime heritage**, with many settlements relying on the sea for their livelihoods. These communities are predominantly rural, with a few urban areas such as Stornoway on the Isle of Lewis and Oban on the mainland playing central roles in local economies.

Fishing remains a key industry, with ports such as Stornoway, Ullapool, Campbeltown, Kinlochbervie and Oban supporting the local economy through both traditional fishing and aquaculture. Traditional fishing activities in the zone include mostly shellfish harvesting, with demersal fishing activities including the harvesting of haddock ling and blue ling mainly in Kinlochbervie and Lochinver. The Hebrides are also home to growing

[186] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[187] NOAA (2020): Ocean acidification
[188] IPCC (2019): Special Report on the Ocean and Cryosphere in a Changing Climate
[189] United Nations (no date): How is climate change impacting the world's ocean
[190] The Scottish Parliament (2024): Renewable energy map of Scotland
[191] Offshore Wind Scotland (2022): ScotWind Leasing Round

aquaculture operations, including salmon farming, which has become increasingly important to local economies.

The districts in the zone and the tonnage and value of **fish landed in 2023** is set out in Table 18.1 below.

Table 18.1: Tonnage and value of all fish landed in 2023 at districts for fisheries landings in Zone M1 (source: Scottish Sea Fisheries Statistics 2023)

District	Quantity ('000 tonnes)	Main species landed	Value (£ million)
Ullapool[1]	11.6	Haddock	22.5
Ayr	7.1	Queen Scallops	11.1
Kinlochbervie[1]	6.2	Haddock	13.7
Campbeltown	3.2	Nephrops	13.3
Stornoway	3.1	Nephrops	13.8
Oban	2.3	Scallops	12.2
Mallaig	1.7	Nephrops	6.6
Portree	1.3	Nephrops	9.1
Lochinver	1.2	Ling	1.8

[1] part of the landing district falls outside the zone area

The west coast of Scotland and the Hebrides also have a growing presence in marine **tourism**, with visitors drawn to the region's natural beauty, wildlife, heritage, and recreational opportunities such as sailing, kayaking, and coastal walks. The North Coast 500 (NC500), a popular scenic driving route that takes in much of the north-western and western Highlands, is a key attraction for tourists exploring the coast along the mainland. The Zone is also particularly known for birdwatching tourism, with seabird colonies commonly found along the coast.

Military activities also play a role in the zone, with maritime training areas and naval exercises occurring in some parts, such as MoD Hebrides on the Isle of Lewis.

The coastline and marine resources are integral to the identity and economy of these communities, providing both traditional and emerging opportunities. The area's cultural heritage, including **Gaelic traditions** and **crofting**, remains a vital part of local life. This has been discussed in more detail under Zone T1.

18.5. Cultural heritage and historic environment

There are large numbers of **heritage assets** in the immediate vicinity of Zone M1. They include both designated and non-designated heritage assets and include a range of scheduled monuments, listed buildings, registered parks and gardens and registered battlefields. The settings of many of these assets (and their significance) are heavily influenced by the marine environment.

The zone includes part of **two WHSs** (see Figure 18.2 overleaf), which are:

- **St Kilda** (**1**) was inscribed as a UNESCO WHS in 1986, recognising its outstanding natural and cultural significance. The WHS encompasses a volcanic archipelago situated off the coast of the Hebrides, renowned for its dramatic landscapes, including high cliffs and sea stacks. St Kilda is an internationally important area for seabirds, being home to the UK's largest colony of Atlantic puffins. The site also has a rich human history, with evidence of continuous habitation for at least 2,000 years until the latest residents left in 1930.
- The **Frontiers of the Roman Empire** (**2**) was first inscribed as a UNESCO WHS in 1987. This designation initially included Hadrian's Wall, situated on the Scottish-English border. The site was later amended to incorporate additional sections of the Roman frontier, including the Upper German-Raetian Limes in Germany in 2005 and the Antonine Wall in Scotland in 2008. These additions reflect the extensive and diverse nature of the Roman Empire's border defence system, which stretched over 5,000 km across Europe, from the Atlantic coast in the west to the Black Sea in the east.

In terms of **archaeology**, there is an abundance and variety of archaeological remains along Scotland's west coast and in the Hebrides. Notable areas include Kilmartin Glen, renowned for its prehistoric cairns and rock art; the Callanish Stones on Lewis; the brochs and burial cairns of the Uists and Benbecula; and Iona, with its medieval monastic heritage. These areas, rich in scheduled monuments, reflect millennia of human activity and cultural significance.

Given the location of the zone at the gateway to the North Atlantic, the Irish Sea, and the Minch, and the topography and geomorphology of the coastline, there are significant numbers of **shipwreck sites** along the coast of mainland Scotland and the Hebrides.

Historic Marine Protected Areas (MPAs) are designated under Section 67 of the Marine (Scotland) Act 2010 to protect marine historic assets (including historic shipwrecks) of national importance within Scottish territorial waters. There are **six MPAs** in Zone M1, all located off mainland Scotland's western coast; two in the north-west (**3**), three by the Isle of Mull (**4**), and one in the Firth of Clyde (**5**) (see Figure 18.2 overleaf).

Coastal erosion is putting heritage assets and levels of access at risk, which may accelerate in the long-term due to climate change and sea level rise.

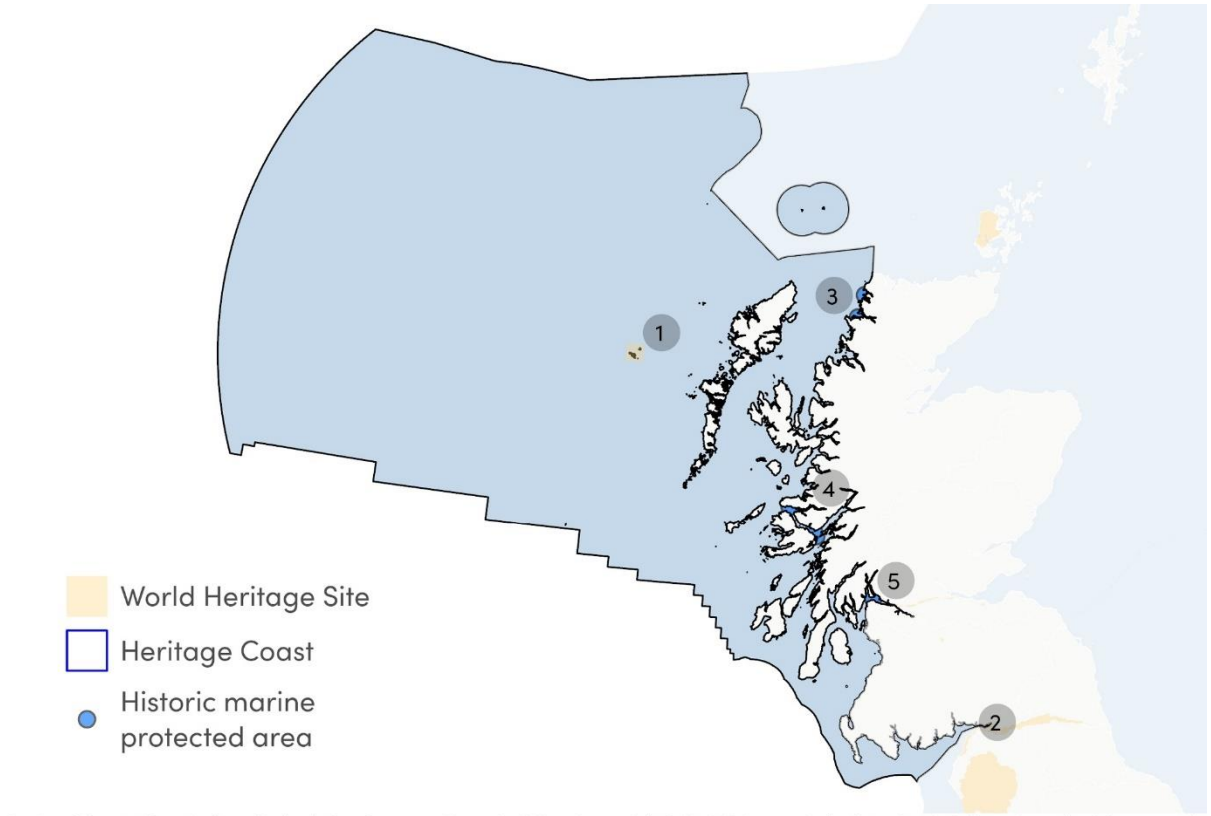


Figure 18.2: Designated heritage assets within Zone M1

18.6. Ecology and biodiversity

Zone M1 contains a diverse range of **habitats and species**. There are a significant number of statutory designations for protecting the marine environment within and bordering the zone. The zone contains a variety of deep sea and shallow water habitats.

A variety of **coastal habitats** feature within Zone M1, such as rocky cliffs, sea caves, sheltered bays, and extensive intertidal areas.

The coastline is characterised by habitats such as sheltered muddy gravels, maerl beds, seagrass meadows, sand dunes, and intertidal mudflats, which support a rich diversity of marine life.

Estuarine habitats, including saltmarshes and mudflats, are also prevalent, providing important breeding grounds for wildlife.

The waters around the Hebrides and western Scotland are home to **cold-water corals**, **basking sharks**, **seals**, and a variety of **fish species**, making the area ecologically significant.

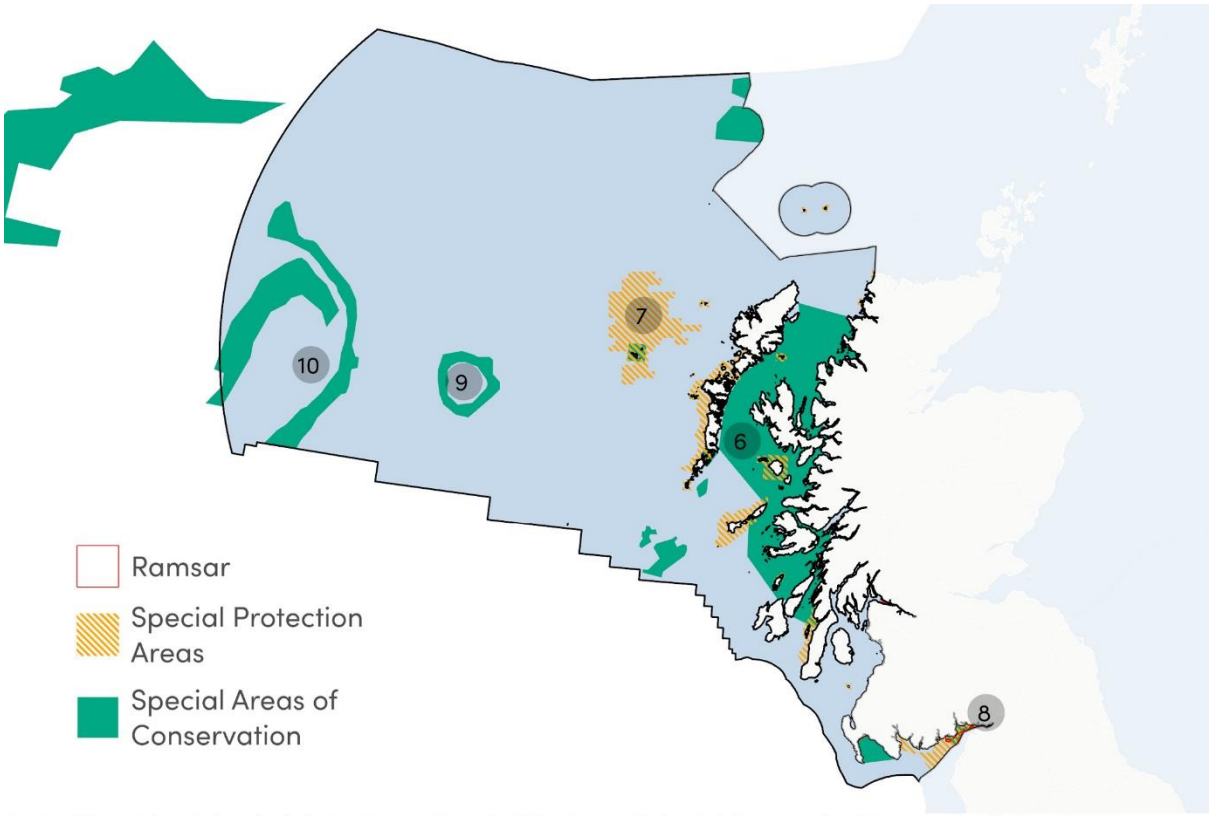


Figure 18.3: Internationally designated sites for biodiversity in Zone M1

A significant proportion of the western Scottish coastline (mainland and on the Hebrides) is designated for its biodiversity value. Internationally designated sites for biodiversity – **SACs**, **SPAs** and **Ramsar sites** – in Zone M1, as shown in Figure 18.3 above, include:

- The Inner Hebrides and the Minches SAC (**6**)
- Seas off St Kilda SPA (**7**)
- Upper Solway Flats and Marshes Ramsar site (**8**)
- Anton Dohrn Seamount SAC (**9**)
- East Rockall Bank SAC (**10**)

Nationally designated sites for biodiversity, including **SSSIs** and **NNRs**, are also located throughout Zone M1 (see Figure 18.4 overleaf). These include (but are not limited to):

- Torrs Warren - Luce Sands SSSI
- West Coast of Jura SSSI

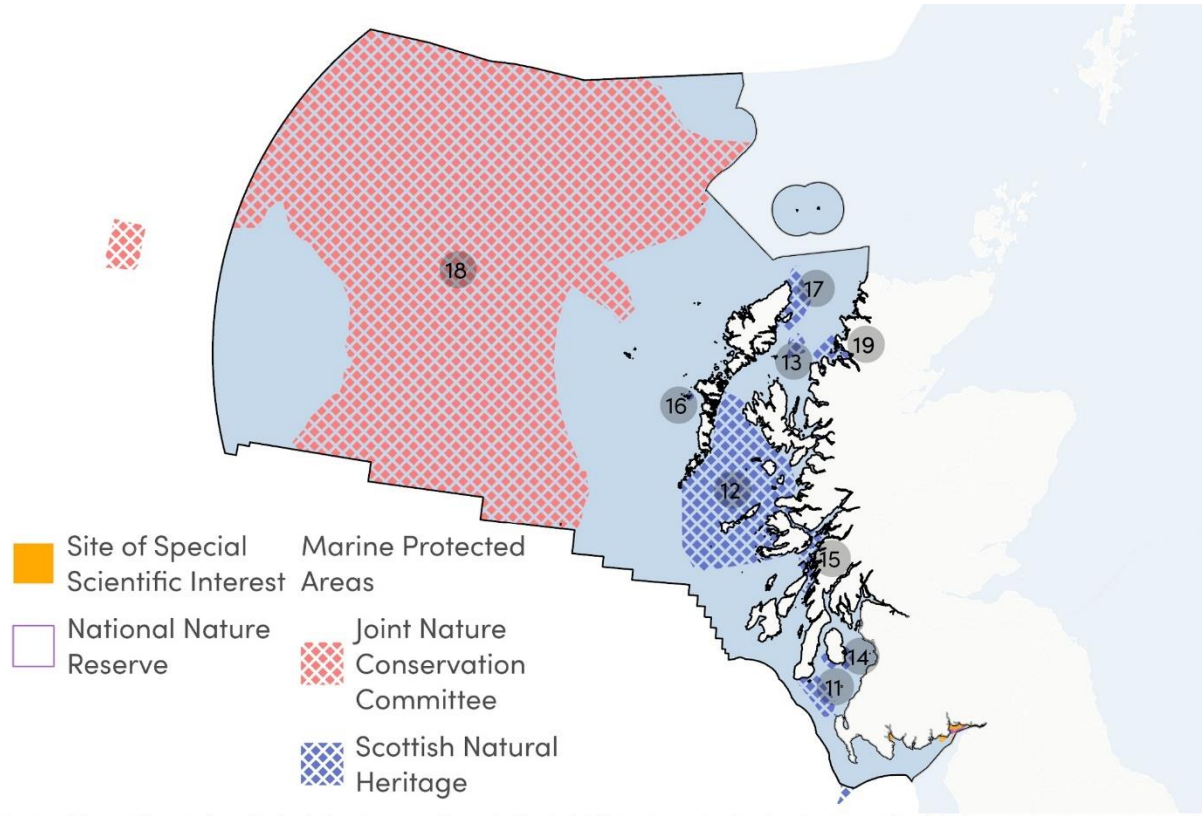


Figure 18.4: Nationally designated sites for biodiversity in Zone M1

Marine Protected Areas (MPAs) are designed to protect Scotland's seas, marine life and habitats from damage caused by human activities. The Scottish government have designated a network of MPAs covering around 37% of the seas around Scotland. This includes inshore and offshore waters. There are **19 MPAs** in Zone M1, which are:

- Clyde Sea Sill (**11**)
- Loch Sween
- The Sea of the Hebrides (**12**)
- Red Rocks and Longay
- The Shiant East Bank (**13**)
- The Geikie Slide and Hebridean Slope
- South Arran (**14**)
- Loch Sunart to the Sound of Jura (**15**)
- Loch Creran
- The Small Isles
- The Monach Isles (**16**)
- North-east Lewis (**17**)
- West of Scotland (**18**)
- Upper Loch Fyne and Loch Goil
- Loch Sunart
- Lochs Duich, Long and Alsh
- Wester Ross (**19**)
- The West Shetland Shelf

- The Barra Fan and Hebrides Terrace Seamount

Deep sea habitats in the zone are vulnerable to impacts such as habitat loss or damage from mobile fishing gear (bottom trawling) and smothering of sediment or habitat damage from marine litter (such as discarded nets). Expansion of deep-sea fisheries has the potential to increase the likelihood of such impacts.

18.7. Land and soil resources

Given the zone is a marine zone, there are no specific elements related to land and soil in this area.

There are no areas currently licensed for marine aggregate extraction; however, potential **mineral resources** (including construction aggregate and fill aggregate) have been identified in areas off Scotland's western coast.[192]

18.8. Landscape and seascape

Zone M1 has a diverse range of seascape types which reflect the interplay of the Zone's topography, geology, biodiversity, land uses and cultural heritage.

The seascape of Scotland's west coast is characterised by a diverse coastal environment. The coastline features a mixture of **rugged cliffs**, **deep sea lochs**, **sandy beaches**, and small, **sheltered coves**. The Hebrides, including the Inner and Outer Hebrides, are integral parts of this seascape, with their distinctive landscapes shaped by geological processes such as **erosion**, **glaciation**, and **volcanic activity**. The western coastline offers spectacular views, from the **jagged peaks** of the Cuillin Hills on the Isle of Skye to the long **sandy beaches** of North Uist and Barra.

National Scenic Areas (NSAs) are designated to identify Scotland's finest scenery and ensure its protection from inappropriate development. Scotland's west coast is home to **25 NSAs**, which highlight the scenic value of the region and provide a framework for managing and preserving its natural beauty.

18.9. Water

The waters of Scotland's west coast are diverse, with characteristics shaped by tidal movements, wave action, and water quality challenges.

The **tidal range** in Zone M1 generally falls between 1 m and 5 m, with the exception being the inner Solway Firth, which can reach up to 8 m.[193] This variation in tidal range influences the coastal ecosystems and marine activities in the area.

Wave heights along the west coast of Scotland are significant, with annual mean significant wave heights at the mainland coast ranging from 1 m to 1.5 m. Further offshore, these heights can reach over 3.6 m. The wave power is notably greater in the winter compared to the summer, reflecting the seasonal variability in marine conditions.[193]

[192] Marine Scotland Assessment (no date): Aggregates
[193] Scottish Government (2008): Scotland's seas: towards understanding their state

Salinity in the open sea is controlled by the balance between evaporation (fresh water out) and precipitation or run-off from land (fresh water in). Many west coast Scottish sea lochs (such as Loch Linnhe and Loch Fyne) have restricted water exchange with the surrounding seas, particularly those with a sill at the mouth of the loch, and this means they can have salinities that differ considerably from those of the open sea.[194]

Bathing water quality has improved in recent years on Scotland's west coast, with all of the zone's beaches achieving sufficient, good, or excellent status for the 2024 bathing season. No beaches were classified as 'Poor' for the 2024 bathing season.[195]

Nutrient pollution is generally not an issue in Zone M1, with the exception of the areas by the Firth of Clyde and Solway Firth, where dissolved inorganic nitrogen concentrations have been recorded as high.[196] This has significant ecological impacts in these areas, affecting marine life and water quality.

Marine litter is a persistent problem, attributed to tourism, fishing activities, and litter entering UK waters through prevailing currents. Scotland's 2020 Marine Assessment found that Clyde was the second most polluted survey area for beach litter in Scotland.[197]

The west coast of Scotland has also experienced significant **coastal flood events** in recent years. These events underscore the vulnerability of coastal areas to extreme weather conditions and rising sea levels, necessitating robust management and adaption / mitigation strategies. A recent example of this was Storm Ashley in October 2024, which brought high winds and heavy rain, leading to coastal flooding due to a combination of high tides and large waves. This event caused flooding of coastal roads, paths, and properties near the coast, leading to significant disruption to travel and infrastructure.

18.10.Key issues for Zone M1

The following key issues have been identified through the review of the baseline information for Zone M1:

- Marine data recorded by the Stornoway tidal gauge indicates that the **sea level** is expected to rise in this zone by 0.46m by 2100, relative to the 1981-2000 average.
- **Wave heights** along the west coast of Scotland are significant.
- While there are currently no offshore wind farms in Zone M1, the area has been identified as having significant potential for **offshore wind energy**.
- Communities along Scotland's western coastline, including the Hebrides, are deeply rooted in the zone's **maritime heritage**, with many settlements relying on the sea for their livelihoods. These communities are predominantly rural, with a few urban areas such as Stornoway on the Isle of Lewis and Oban on the mainland playing central roles in local economies.

[194] Scottish Government (2011): Scotland's Marine Atlas: Information for The National Marine Plan
[195] SEPA (no date): Scotland's Bathing Waters
[196] Scottish Government (no date): Eutrophication – Dissolved inorganic nitrogen (salinity normalised) 2012-2019
[197] Marine Scotland Assessment (no date): Beach litter

- The coastline's cultural heritage, including **Gaelic** traditions, remains a vital part of local life.
- The west coast of Scotland and the Hebrides have a growing presence in marine **tourism**, with visitors drawn to the region's natural beauty, wildlife, heritage, and recreational opportunities.
- **Fishing** remains a key industry, with ports such as Stornoway, Ullapool, Campbeltown, Kinlochbervie and Oban supporting the local economy through both traditional fishing and aquaculture.
- There is an abundance and variety of **archaeological remains** along Scotland's west coast and in the Hebrides.
- There are significant numbers of **shipwreck sites** along the coast of the mainland and the Hebrides.
- The zone contains a variety of deep sea and shallow water **habitats**.
- A significant proportion of the western Scottish coastline (mainland and on the Hebrides) is designated for its **biodiversity** value.
- There are **18 MPAs** in the zone.
- **Deep sea habitats** in the zone are vulnerable to impacts such as habitat loss or damage from mobile fishing gear (bottom trawling) and smothering of sediment or habitat damage from marine litter (such as discarded nets).
- **Bathing water quality** has improved in recent years on Scotland's west coast, with all of the zone's beaches achieving sufficient, good, or excellent status for the 2024 bathing season.
- **Marine litter** is a persistent problem, attributed to tourism, fishing activities, and litter entering UK waters through prevailing currents. Scotland's 2020 Marine Assessment found that Clyde was the second most polluted survey area for beach litter in Scotland.

19. Zone M2: North Scotland

Overview of Zone M2

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for M2

19.1. Overview of Zone M2

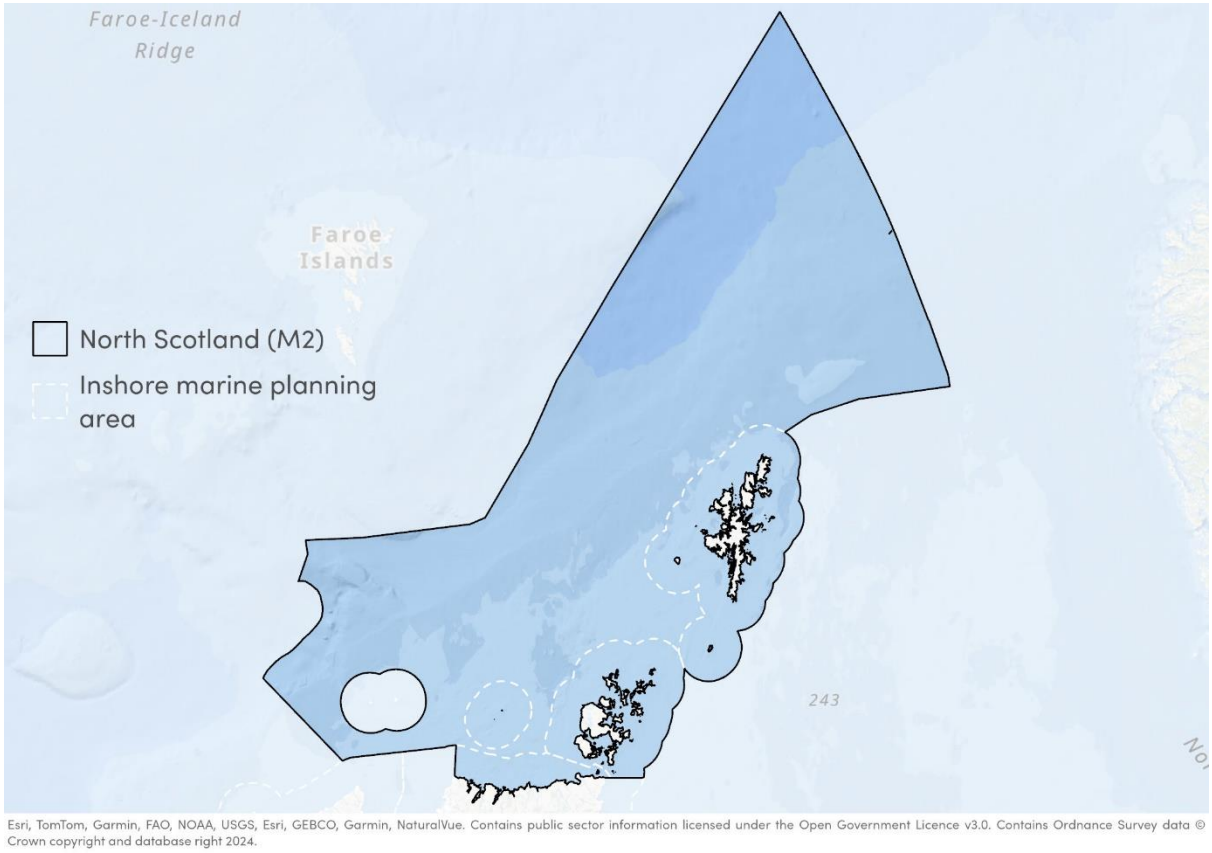


Figure 19.1: Area covered by Zone M2 – North Scotland

Zone M2 covers the marine area surrounding the north of Scotland and the Shetland Isles and Orkney Isles. It includes the Scottish Marine Regions of North Coast, Shetland Isles, and Orkney Islands, as well as the Offshore Marine Regions of North Scotland Shelf, Faroe Shetland Channel, and North and West Shetland Shelf.

Zone M2 (as shown in Figure 19.1 above) incorporates the coastline along the northern mainland of Scotland, stretching from Cape Wrath in the west to Duncasby Head in the east. It also includes the coastlines surrounding the Orkney and Shetland archipelagos (collectively known as the Northern Isles), located north-east of the mainland. Additionally, the zone covers extensive areas of the Atlantic Ocean, extending approximately 580 km north of mainland Scotland.

The zone borders three council areas (Highland, Orkney Islands, and Shetland Islands) and three National Landscapes (Shetland, Hoy and West Mainland, and Kyle of Tongue).

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

19.2. Air quality

No significant air quality issues affect Zone M2. Port activities and ship-source pollutants can be an issue in some port locations, including relating to NOx, SOx and particulate

matter. However, these are relatively insignificant; none of the main port areas are designated AQMAs due to port activities. Oil and gas activities cause some air quality issues in the zone; these are though localised.

All of the SEPA's automatic air quality monitoring sites in the zone recorded low air pollution levels as of December 2024.[198] Additionally, all sites in SEPA's NO_2 diffusion tube network recorded levels below the annual mean objective for NO_2 in the latest year of monitoring (2023).

19.3. Climate change

Impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projections, in Scotland winters in the 2070s (2061-2080) could be up to 2.8°C warmer and 12% wetter, with summers up to 4°C hotter and 17% drier. In terms of the warming of the sea, data indicates there has been a sea surface temperature increase of approximately 0.3°C per decade for the last 40 years around the UK[199].

Mean sea level rise around the UK has been between 12-16cm since 1900[200] and sea level projections to 2300 suggest that UK sea levels will continue to rise over the coming centuries under all RCP climate change scenarios. As highlighted by the Met Office, the UK is locked into accelerated sea level rise over this timeframe regardless of trends in greenhouse gas emissions[201].

UK tide gauge records show substantial year to year changes in coastal water levels[202]. Marine data recorded by the **Lerwick tidal gauge** indicates that the sea level is expected to rise in this zone by **0.59m by 2100**[203], relative to the 1981-2000 average[204]. This is based on the RCP4.5 emissions scenario[205]; it is noted that projections of sea level change around the UK can vary substantially by climate change scenario. It is noted that mean sea level rise in Scotland is anticipated to be lower than that in the southern extent of the UK, due to differences in vertical land movement – parts of Scotland are rising, and parts of southern England are sinking due to isostatic uplift.

In addition to sea level rise, climate change has resulted in further impacts to ocean systems that have caused irreversible losses in coastal and open ocean marine

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[198] Air Quality in Scotland (no date): Latest pollution map

[199] National Oceanography Centre (2023): New report predicts UK oceans to warm by more than three degrees by 2100

[200] Horsburgh, K. et al. (2020): Impacts of climate change on sea-level rise relevant to the coastal and marine environment around the UK

[201] Met Office (2019): UK sea level projections to 2300

[202] Met Office (2018): UKCP18 Marine report

[203] This is the 50th percentile figure and has been selected as it is a stable measurement to evaluate long-term trends.

[204] Met Office (no date): UKCP data

[205] RCP4.5 assumes that global emissions peak around 2040 and then decline, leading to a moderate level of climate change. To achieve this emissions scenario, global climate policies focused on reducing greenhouse gas emissions through technological innovation and sustainable practices will be required. RCP4.5 is often used in climate modelling to assess future climate impacts and to guide policy decisions.

ecosystems[206]. The ocean acts as a carbon sink; a natural reservoir that absorbs the atmosphere's carbon through physical and biological means. It is estimated that the ocean absorbs approximately 30% of carbon dioxide that is released into the atmosphere; when it is absorbed by seawater, a series of chemical reactions occur which result in ocean acidification[207]. Human-induced climate change has caused further ocean acidification – open ocean surface pH has declined between 0.017–0.027 pH units per decade since the last 1980s[208]. This impacts upon the ecosystems within the ocean, and can have a further impact upon food production due to changes in the distribution and abundance of fish populations. Additionally, climate change has an impact on extreme wave height (linked to coastal erosion and flooding), and marine heat-related events; it is reported that marine heatwaves have doubled in frequency, have become longer lasting, and are more intense. This results in widespread coral bleaching and reef degradation[209] - which can further impact upon the loss of marine biodiversity.

In terms of **climate change mitigation**, there are many onshore windfarms in coastal areas of Zone M2, with higher concentrations found in the east, particularly on the Orkney Islands.[210] While there are currently no offshore wind farms in Zone M2, the area has been identified as having significant potential for offshore wind energy. ScotWind's latest leasing round has allocated several areas of seabed for offshore wind energy development in Scottish waters in Zone M2, including a large, fixed site west of the Orkney Islands (which is currently in the Planning stage of development).[211]

19.4. Community wellbeing

Communities along the northern coast of Scotland and the Northern Isles have a long-standing connection to the sea, with many settlements dependent on **maritime industries** for their livelihoods. These areas are predominantly rural, with key hubs such as Kirkwall in Orkney and Lerwick in Shetland playing central roles in local economies.

The zone's **fishing** industry remains one of the most significant in Scotland; for example, Shetland alone accounts for 81% of all Scottish mussels.[212] Shetland is also a major contributor for mackerel and herring harvesting, and some demersal fishing activities including the harvesting of haddock, cod and monkfish. Ports such as Lerwick and Stromness support both traditional fishing and the growing **aquaculture** sector, including shellfish farming and salmon production.

The fishing districts in the zone and the tonnage and value of **fish landed in 2023** is set out in Table 19.1 below.

[206] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[207] NOAA (2020): Ocean acidification
[208] IPCC (2019): Special Report on the Ocean and Cryosphere in a Changing Climate
[209] United Nations (no date): How is climate change impacting the world's ocean
[210] The Scottish Parliament (2024): Renewable energy map of Scotland
[211] Offshore Wind Scotland (2022): ScotWind leasing round
[212] Seafood Shetland (no date): Our Industry in Numbers

Table 19.1: Tonnage and value of all fish landed in 2023 at districts for fisheries landings in Zone M2 (source: Scottish Sea Fisheries Statistics 2023)

District	Quantity ('000 tonnes)	Main species landed	Value (£ million)
Shetland	57.9	Mackerel	90.0
Scrabster[1]	13.1	Haddock	27.0
Kinlochbervie[1]	6.2	Haddock	13.7
Orkney	2.0	Crab	8.6

[1] part of the landing district falls outside the zone area

The Zone is also home to a thriving **marine tourism** industry, with visitors attracted to the area's rugged landscapes, wildlife, and outdoor activities like sailing, hiking, and birdwatching. The Zone is also home to unique seabird colonies, including puffin and gannet populations, also make the area an attractive destination for birdwatchers. The North Coast 500 (NC500), a scenic driving route passing through the north of Scotland, is an additional attraction for tourists exploring the mainland coast.

The coastal and marine environment is also integral to the cultural and economic identity of these communities, with traditional practices such as **crofting** and the use of Gaelic language still present in some locations on the mainland.

Military activities, including naval exercises and maritime training areas, are also part of the landscape in some parts of the region, such as the Ministry of Defence training area at Cape Wrath in the far north of Scotland.

The coastline and marine resources are integral to the identity and economy of these communities, providing both traditional and emerging opportunities.

19.5. Cultural heritage and historic environment

There are large numbers of **heritage assets** in the immediate vicinity of Zone M2. They include both designated and non-designated heritage assets and include a range of scheduled monuments, listed buildings, registered parks and gardens and registered battlefields. The settings of many of these assets (and their significance) are heavily influenced by the marine environment.

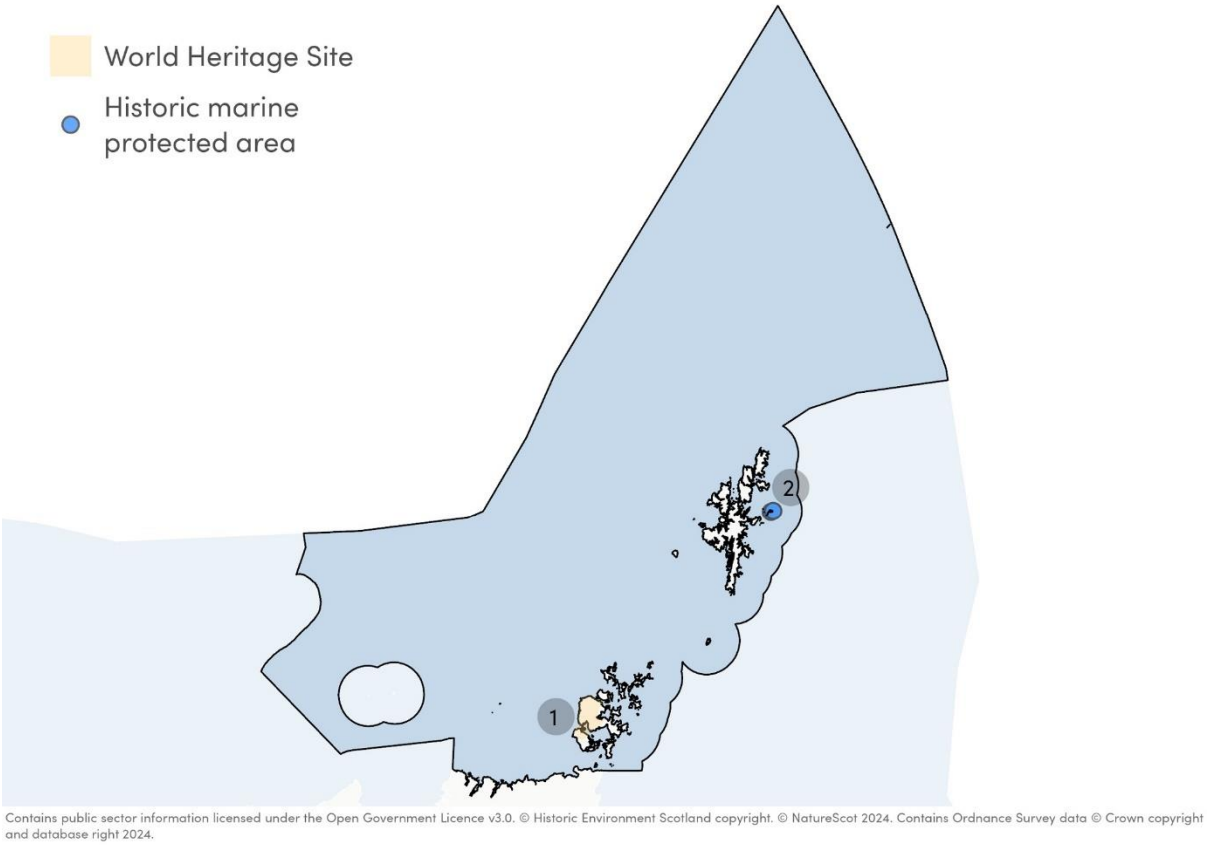

Figure 19.2: Designated heritage assets within Zone M2

The zone includes part of the **Heart of Neolithic Orkney WHS** (**1**) (see Figure 19.2 above). This was inscribed as a UNESCO WHS in 1999, recognising its exceptional archaeological significance. This site comprises a group of Neolithic monuments on the Orkney Islands, including the settlement of Skara Brae, the chambered tomb of Maeshowe, and the ceremonial stone circles of the Ring of Brodgar and the Stones of Stenness. These monuments provide a vivid depiction of life in this remote archipelago around 5,000 years ago, showcasing the social structures and spiritual beliefs of the time.

In terms of **archaeology**, there is an abundance and variety of archaeological remains along the north coast of Scotland and in the Northern Isles. Notable areas include the Heart of Neolithic Orkney (**1**), renowned for its ancient monuments such as Skara Brae, Maeshowe, and the Ring of Brodgar; the brochs of Shetland, including the well-preserved Mousa Broch; and the Viking sites of Orkney and Shetland, which reflect the islands' Norse heritage. These areas, rich in scheduled monuments, reflect millennia of human activity and cultural significance.

Given the location of the zone at the entrance to the North Atlantic and the Pentland Firth, and the topography and geomorphology of the coastline, there are significant numbers of **shipwreck sites** along the coast of mainland northern Scotland and the Northern Isles. This includes at Scapa Flow, where there are numerous wrecks from WWI and WWII.

Historic MPAs are designated under Section 67 of the Marine (Scotland) Act 2010 to protect marine historic assets (including historic shipwrecks) of national importance within Scottish territorial waters. There are two MPAs in Zone M2 (as shown in Figure 19.2

above): the Kennemerland and Wrangels Palais locations of the **Out Skerries Historic MPA** (**2**), which are both located along the coast of Bruray in Shetland.

Coastal erosion is putting heritage assets and levels of access at risk, which may accelerate in the long-term due to climate change and sea level rise.

19.6. Ecology and biodiversity

Zone M2 contains a diverse range of **habitats and species**. There are a significant number of statutory designations for protecting the marine environment within and bordering the zone, which are discussed overleaf.

A variety of **coastal and marine habitats** feature along the northern coast of Scotland and the Northern Isles, such as towering cliffs, sandy beaches, and rugged rocky shores.

The zone's coastline is characterised by habitats such as kelp forests, tidal rock pools, sea caves, and intertidal sandflats, which support a rich diversity of marine life.

On the Northern Isles submerged reefs and maerl beds are also prominent, providing vital feeding and breeding grounds for marine species.

The zone's habitats support **puffins**, **grey and harbour seals**, **orcas**, and an array of **seabirds**, making the region ecologically significant.

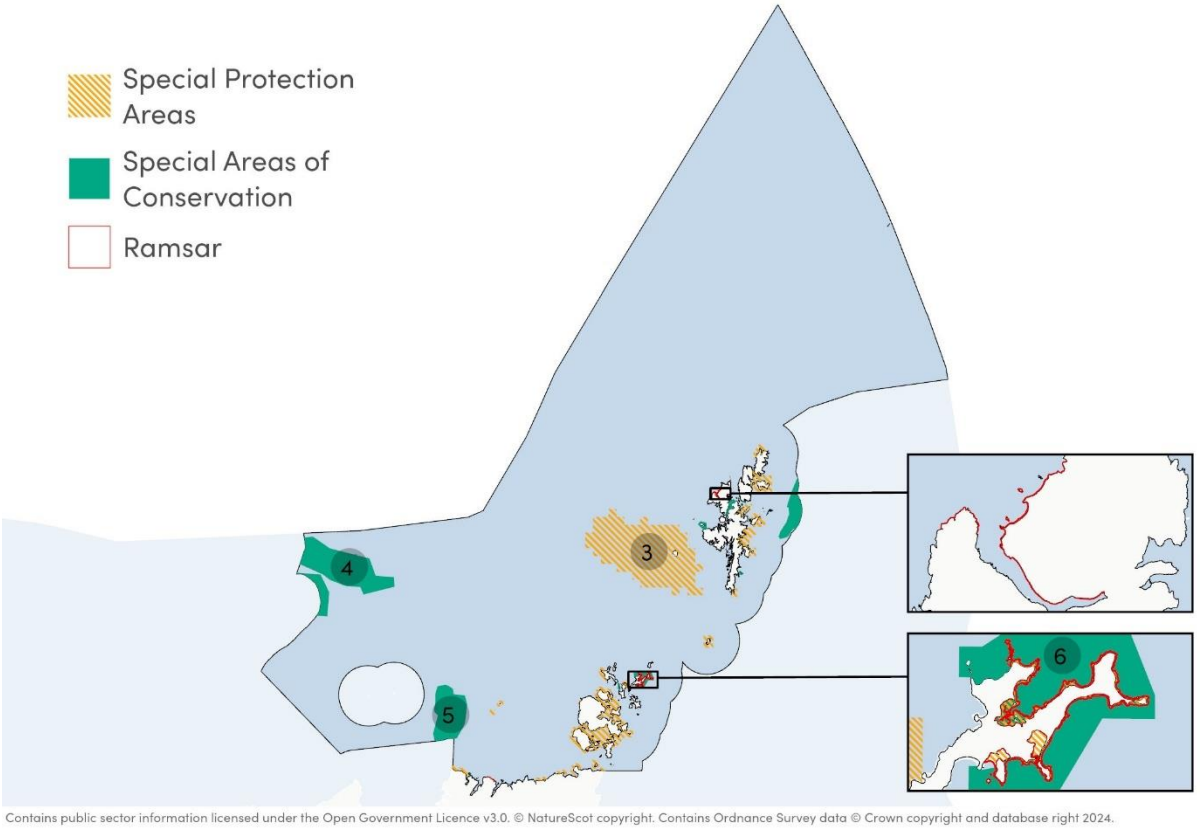

Figure 19.3: Internationally designated sites for biodiversity in Zone M2

A significant proportion of the north of Scotland's coastline is designated for its biodiversity value. Internationally designated sites for biodiversity – **SACs**, **SPAs** and **Ramsar sites** – in Zone M2, as shown in Figure 19.3 above, include:

- The Seas off Foula SPA (**3**)
- Wyville Thomson Ridge SAC (**4**)
- Solan Bank Reef SAC (**5**)
- Sanday SAC (**6**)

Nationally designated sites for biodiversity, including **SSSIs** and **NNRs**, are less prevalent in Zone M2 (see Figure 19.4 overleaf).

Figure 19.4: Nationally designated sites for biodiversity in Zone M2

Nationally designated sites, in the form of **SSSIs**, are also located throughout Zone M2, including, but not limited to, the Red Point Coast and East Sanday Coast.

MPAs are designed to protect Scotland's seas, marine life and habitats from damage caused by human activities. The Scottish government has designated a network of MPAs covering around 37% of the seas around Scotland. This includes inshore and offshore waters. There are **9 MPAs** in Zone M2, which are:

- The North-east Faroe-Shetland Channel (**7**)
- Faroe-Shetland Sponge Belt (**8**)
- The North-west Orkney (**9**)
- The West Shetland Shelf (**10**)
- West of Scotland (**11**)
- The Mousa to Boddam
- Papa Westray

- Fetlar to Haroldswick
- The Wyre and Rousay Sounds

Deep sea habitats in the zone are vulnerable to impacts such as habitat loss or damage from mobile fishing gear (bottom trawling) and smothering of sediment or habitat damage from marine litter (such as discarded nets). Expansion of deep-sea fisheries has the potential to increase the likelihood of such impacts.

19.7. Land and soil resources

Given the zone is a marine zone, there are no specific elements related to land and soil in this area.

There are no areas currently licensed for marine **aggregate extraction** in Scotland; however, potential mineral resources (including construction aggregate and fill aggregate) have been identified in areas off Scotland's northern coast.[213]

19.8. Landscape and seascape

The zone has a diverse range of seascape types which reflect the interplay of the zone's topography, geology, biodiversity, land uses and cultural heritage.

The seascape of northern mainland Scotland and the Northern Isles presents a varied and distinctive coastal environment. The coastline includes **high, sheer cliffs**, such as those at Yesnaby in Orkney and Eshaness in Shetland, alongside **broad sandy bays** like Dingieshowe in Orkney, St Ninian's Isle in Shetland, and a number of bays along the north coast mainland. Rocky shores with **wave-cut platforms** are interspersed with sheltered **coves** and small **harbours**.

Offshore, numerous **skerries**, **sea stacks**, and **islets** create a complex seascape shaped by millennia of erosion and the strong tidal currents of the surrounding seas.

The **geology** is diverse, featuring old red sandstone in Orkney and ancient metamorphic rocks in Shetland, which influence the shape and structure of the coastline.

NSAs are designated to identify Scotland's finest scenery and ensure its protection from inappropriate development. Scotland's north coast is home to **three NSAs**: Shetland, Hoy and West Mainland, and Kyle of Tongue. The presence of these NSAs highlight the scenic value of the Zone and provide a framework for managing and preserving its natural beauty.

19.9. Water

The waters of Scotland's north coast are diverse, with characteristics shaped by tidal movements and wave action.

The **tidal range** in Zone M2 generally falls between 1 m and 4 m.[214] This variation in tidal range influences the coastal ecosystems and marine activities in the area.

[213] Marine Scotland Assessment (no date): Aggregates
[214] Scottish Government (2008): Scotland's seas: towards understanding their state

Wave heights along the north coast of Scotland are significant, with annual mean significant wave heights at the mainland coast ranging from 1 m to 2 m. Further offshore, and surrounding the Northern Isles, these heights can reach 3.2 m in height. The wave power is notably greater in the winter compared to the summer, reflecting the seasonal variability in marine conditions.[193]

Salinity in the open sea is controlled by the balance between evaporation (fresh water out) and precipitation or run-off from land (fresh water in). In Zone M2, this is influenced by the interaction of the North Atlantic Ocean and the Norwegian Sea, where saline Atlantic water mixes with fresher currents from the Arctic. The complex tidal systems and strong currents in the area contribute to well-mixed water columns, maintaining relatively stable salinity levels.[215]

Bathing water quality has improved in recent years on Scotland's north coast, with all of the Zone's beaches achieving sufficient, good, or excellent status for the 2024 bathing season. No beaches were classified as 'Poor' for the 2024 bathing season.[216]

Nutrient pollution generally not an issue in Zone M2, with the exception of a few locations east of Lerwick on Shetland, where dissolved inorganic nitrogen concentrations have been recorded as above background concentrations.[217] This has ecological impacts in these areas, affecting marine life and water quality.

Marine litter is low in Zone M2. Scotland's 2020 Marine Assessment found that Orkney was the least polluted survey area for beach litter in Scotland.[218] Of the litter that was found in Orkney during the survey, over 90% was plastic.

The north coast of Scotland and the Northern Isles have experienced several notable **coastal flooding events** in recent years. These incidents highlight the increasing vulnerability of these areas to extreme weather patterns and rising sea levels, necessitating robust management and adaption /mitigation strategies. A recent example of this was Storm Bert in November 2024, which brought high winds and heavy rain, leading to coastal flooding due to a combination of high tides and large waves. This event caused flooding of coastal roads, paths, and properties near the coast, leading to significant disruption to travel and infrastructure.

19.10.Key issues for Zone M2

The following key issues have been identified through the review of the baseline information for Zone M2:

- Marine data recorded by the Lerwick tidal gauge indicates that the **sea level** is expected to rise in this zone by 0.59m by 2100, relative to the 1981-2000 average.
- **Wave height**s along the north coast of Scotland are significant.

[215] Scottish Government (2011): Scotland's Marine Atlas: Information for The National Marine Plan
[216] SEPA (no date): Scotland's Bathing Waters
[217] Scottish Government (no date): Eutrophication – Dissolved inorganic nitrogen (salinity normalised) 2012-2019
[218] Marine Scotland Assessment (no date): Beach litter

- While there are currently limited number of offshore wind farms in Zone M2, the area has been identified as having significant potential for **offshore wind energy**.
- There numerous **onshore windfarms** in coastal areas of Zone M2, including on the Orkney Islands.
- Communities along the northern coast of Scotland and the Northern Isles have a long-standing connection to the sea, with many settlements dependent on **maritime industries** for their livelihoods. These areas are predominantly rural, with key hubs such as Kirkwall in Orkney and Lerwick in Shetland playing central roles in local economies.
- The region's **fishing industry** remains one of the most significant in Scotland. Ports such as Lerwick and Stromness support both traditional fishing and the growing aquaculture sector, including shellfish farming and salmon production.
- **Military activities**, including naval exercises and maritime training areas, are also part of the landscape in some parts of the region, such as the Ministry of Defence training area at Cape Wrath in the far north of Scotland.
- Given the location of the zone at the entrance to the North Atlantic and the Pentland Firth, and the topography and geomorphology of the coastline, there are significant numbers of **shipwreck sites** along the coast of northern Scotland and the Northern Isles. This includes a particular concentration Scapa Flow, where there are numerous wrecks from WWI and WWII.
- A significant proportion of the north of Scotland's coastline is designated for its **biodiversity** value.
- There are **nine MPAs** in Zone M2.
- **Deep sea habitats** in the zone are vulnerable to impacts such as habitat loss or damage from mobile fishing gear (bottom trawling) and smothering of sediment or habitat damage from marine litter (such as discarded nets).
- The seascape of northern mainland Scotland and the Northern Isles presents a varied and distinctive coastal environment.
- **Bathing water quality** has improved in recent years on Scotland's north coast, with all of the Zone's beaches achieving sufficient, good, or excellent status for the 2024 bathing season
- The north coast of Scotland and the Northern Isles have experienced several notable coastal **flooding** events in recent years.

20. Zone M3: East Scotland

Overview of Zone M3

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for M3

20.1. Overview of Zone M3

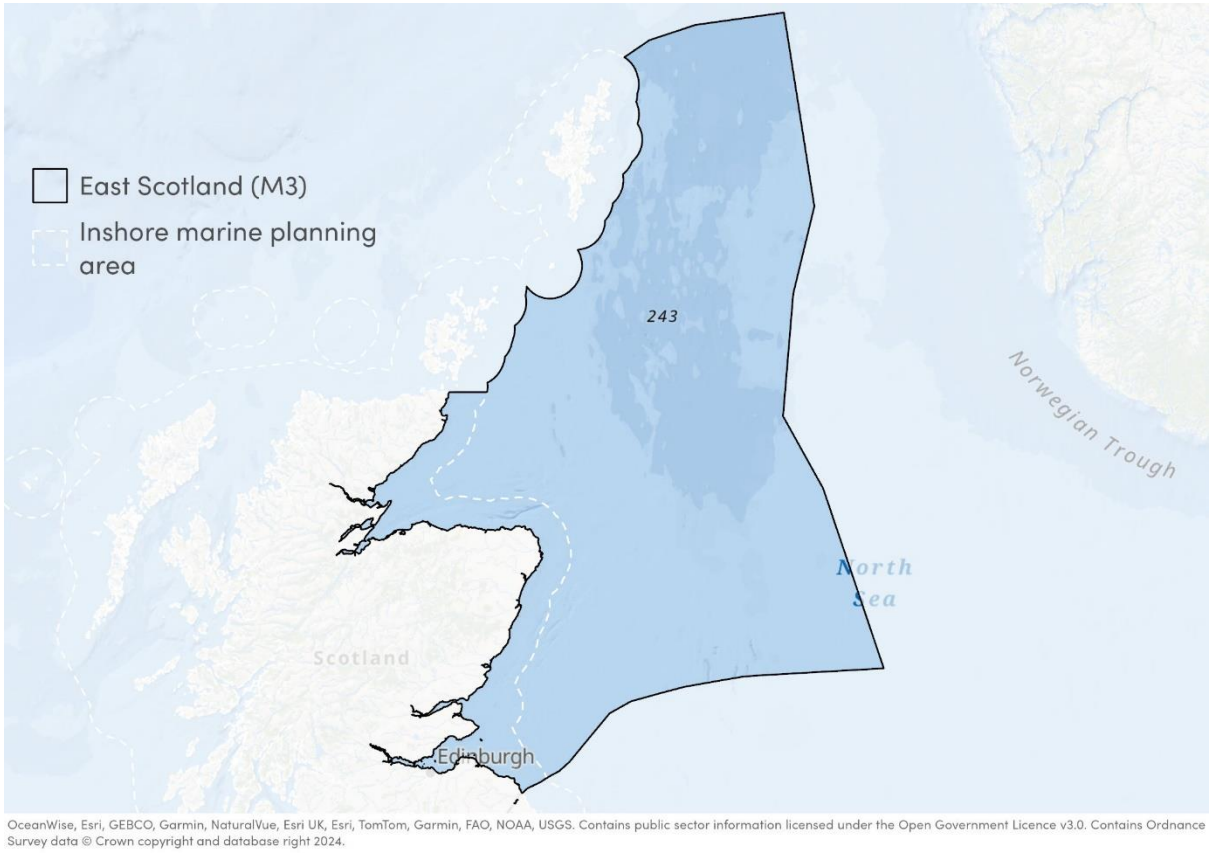

Figure 20.1: Area covered by Zone M3 – East Scotland

Zone M3 covers the marine area off the east of Scotland. It includes the Moray Firth, North East, and Forth and Tay Scottish Marine Regions, and the East Shetland Shelf, Fladen and Moray Firth Offshore, and Long Forties Offshore Marine Regions, covering much of the North Sea.

Zone M3 (as shown in Figure 20.1 above) incorporates the coastline stretching from Duncansby Head in Caithness to Lamberton in Berwickshire. It incorporates the Dornoch Firth, the Cromarty Firth and the Moray Firth, as well as the Tay Estuary and the Firth of Forth

The North Coast, Orkney Islands, and Shetland Isles SMRs, and North and West Shetland Shelf OMR, border this zone to the north, whilst the north east inshore and offshore marine plan areas of England border this zone to the south. The zone borders 14 local authorities.

The marine areas of England and Norway border the OMR part of the zone.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

20.2. Air quality

There are **several AQMAs** adjacent to the zone, most declared for NO_2 and PM_{10} levels. Most notable are the AQMAs in **Aberdeen City Centre** and **Dundee**.

Port activities and ship-source pollutants can be an issue in some port locations, including relating to NO_x, SO_x and PM_{10}. However, this does not provide a significant contribution to the aforementioned AQMAs.

20.3. Climate change

Impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projects, in Scotland winters in the 2070s (2061-2080) could be up to 2.8°C warmer and 12% wetter, with summers up to 4°C hotter and 17% drier. In terms of the warming of the sea, data indicates there has been a sea surface temperature increase of approximately 0.3°C per decade for the last 40 years around the UK[219].

Mean sea level rise around the UK has been between 12-16cm since 1900[220] and sea level projections to 2300 suggest that UK sea levels will continue to rise over the coming centuries under all RCP climate change scenarios. As highlighted by the Met Office, the UK is locked into accelerated sea level rise over this timeframe regardless of trends in greenhouse gas emissions[221].

UK tide gauge records show substantial year to year changes in coastal water levels[222]. Marine data recorded by the **Aberdeen tidal gauge** indicates that the sea level is expected to rise in this zone by **0.37m by 2100**[223], relative to the 1981-2000 average[224]. This is based on the RCP4.5 emissions scenario[225]; it is noted that projections of sea level change around the UK can vary substantially by climate change scenario. It is noted that mean sea level rise in Scotland is anticipated to be lower than that in the southern extent of the UK, due to differences in vertical land movement – parts of Scotland are rising, and parts of southern England are sinking due to isostatic uplift.

In addition to sea level rise, climate change has resulted in further impacts to ocean systems that have caused irreversible losses in coastal and open ocean marine ecosystems[226]. The ocean acts as a carbon sink; a natural reservoir that absorbs the atmosphere's carbon through physical and biological means. It is estimated that the ocean absorbs approximately 30% of carbon dioxide that is released into the atmosphere; when it is absorbed by seawater, a series of chemical reactions occur which result in

[219] National Oceanography Centre (2023): New report predicts UK oceans to warm by more than three degrees by 2100
[220] Horsburgh, K. et al. (2020): Impacts of climate change on sea-level rise relevant to the coastal and marine environment around the UK
[221] Met Office (2019): UK sea level projections to 2300
[222] Met Office (2018): UKCP18 Marine report
[223] This is the 50th percentile figure and has been selected as it is a stable measurement to evaluate long-term trends.
[224] Met Office (no date): UKCP data
[225] RCP4.5 assumes that global emissions peak around 2040 and then decline, leading to a moderate level of climate change. To achieve this emissions scenario, global climate policies focused on reducing greenhouse gas emissions through technological innovation and sustainable practices will be required. RCP4.5 is often used in climate modelling to assess future climate impacts and to guide policy decisions.
[226] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability

ocean acidification[227]. Human-induced climate change has caused further ocean acidification – open ocean surface pH has declined between 0.017–0.027 pH units per decade since the last 1980s[228]. This impacts upon the ecosystems within the ocean, and can have a further impact upon food production due to changes in the distribution and abundance of fish populations. Additionally, climate change has an impact on extreme wave height (linked to coastal erosion and flooding), and marine heat-related events; it is reported that marine heatwaves have doubled in frequency, have become longer lasting, and are more intense. This results in widespread coral bleaching and reef degradation[229] - which can further impact upon the loss of marine biodiversity.

In terms of **climate change mitigation**, Zone M3 has been identified as having significant potential for offshore wind energy. The Beatrice Project in the Moray Firth SMR part of the zone is the world's first offshore wind deep-water demonstration project. ScotWind's latest leasing round has also allocated several areas of seabed for offshore wind energy development in Scottish waters in Zone M3.[230]

With regard to **carbon capture and storage**, the conversion of a Peterhead gas-fired power station (the 'Peterhead project') aims to pioneer CCS technology and make best use of existing infrastructure, helping to establish the area as a hub for CO_2 transport and storage.

20.4. Community wellbeing

The east coast of Scotland is home to a diverse range of communities, from traditional fishing villages and towns more commonly found in the north of the Zone, to modern urban centres like Edinburgh in the south.

Communities along Scotland's east coast, particularly those towards the north of the zone, have a rich **maritime heritage**, with many settlements historically relying on the sea for their livelihoods.

This zone is a major area for **fishing activity**, particularly the harvesting of demersal and pelagic species for domestic consumption and export. Most of the fishing activity takes place from Peterhead, with primary target pelagic species including mackerel, herring and blue whiting. Key demersal species include Haddock, Whiting, Cod and Saithe. In line with districts across the zone, Peterhead also makes sizable contributions towards the harvesting of nephrops.

Fraserburgh and the part of the zone within the Ullapool district are also areas with significant **demersal farming** activity including the harvesting of haddock, monkfish and whiting. Other areas of the zone are primarily involved in shellfish harvesting, including Aberdeen, Anstruther, Buckie and Eyemouth.

[227] NOAA (2020): Ocean acidification
[228] IPCC (2019): Special Report on the Ocean and Cryosphere in a Changing Climate
[229] United Nations (no date): How is climate change impacting the world's ocean
[230] Offshore Wind Scotland (2022): ScotWind leasing round

The districts in the zone and the tonnage and value of **fish landed in 2023** is set out in Table 20.1 below.

Table 20.1: Tonnage and value of all fish landed in 2023 at districts for fisheries landings in Zone M3 (source: Scottish Sea Fisheries Statistics 2023)

District	Quantity ('000 tonnes)	Main species landed	Value (£ million)
Peterhead	169.0	Mackerel	187.2
Fraserburgh	15.6	Nephrops	30.5
Scrabster[1]	13.1	Haddock	27.0
Ullapool[1]	11.6	Haddock	22.5
Eyemouth	1.6	Nephrops	7.0
Anstruther	1.5	Nephrops	5.1
Buckie	1.0	Nephrops	3.8
Aberdeen	0.8	Crabs	4.3

[1] part of the landing district falls outside the zone area

Ship building continues today in Macduff following diversification into pilot boats and survey crafts. Ports like Fraserburgh, Peterhead, and Aberdeen also the local economy through both traditional fishing and aquaculture.

The north of the zone also has a growing presence in **marine tourism**, with visitors drawn to the area's natural beauty, wildlife, heritage, and recreational opportunities such as sailing, kayaking, and coastal walks. For example, the Moray Firth SMR part of the zone is popular with tourists and those wanting to see the dolphins that live in the area, as well as the northern gannets which return on an annual basis to Troup Head to breed, along with common guillemots, black-legged kittiwakes, razorbills and Atlantic puffins. The North Coast 500 (NC500), a popular scenic driving route that passes along the coastline in the north of the Zone is also a key attraction for tourists exploring the north of the Zone.

To the south of the zone, Edinburgh, Scotland's capital, is located along the coast, with the port area of **Leith** serving as the largest enclosed **deep-water port** in Scotland.

20.5. Cultural heritage and historic environment

There are large numbers of **heritage assets** in the immediate vicinity of Zone M3. They include both designated and non-designated heritage assets and include a range of scheduled monuments, listed buildings, registered parks and gardens and registered battlefields. The settings of many of these assets (and their significance) are heavily influenced by the marine environment. Examples include the **Forth Bridge** (which is a WHS), **Dunnottar Castle**, the city of **St Andrews**, and **Fort George** near Inverness.

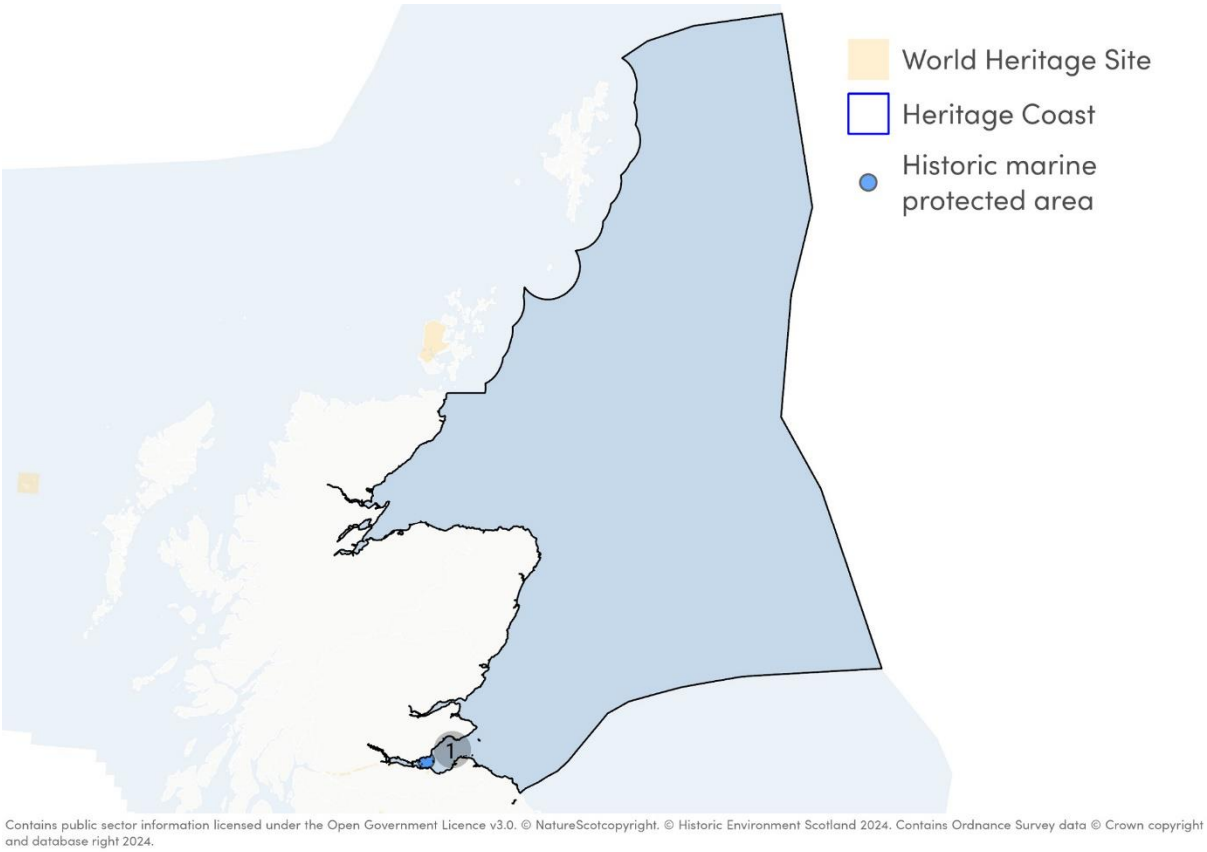

Figure 20.2: Designated heritage assets within Zone M3

The **Campania** (**1**) is the only **historic MPA** within the zone (see Figure 20.2 above).[231] It comprises the remains of a vessel, the Campania, lying wrecked on or in the seabed, objects formerly contained in the vessel, and deposits or artefacts which evidence previous human activity on board the vessel. Campania was a former Cunard liner converted in 1914 as a Fleet Air Arm carrier. She dragged anchor in Burntisland Roads and sank after collision in 1918.

Coastal erosion is putting heritage assets and levels of access at risk, which may accelerate in the long-term due to climate change and sea level rise.

20.6. Ecology and biodiversity

Zone M3 contains a diverse range of **habitats and species**. There are a significant number of statutory designations for protecting the marine environment within and bordering the zone, which are discussed overleaf.

The Moray Firth SMR part of the zone is home to **dolphins**, as well as the **northern gannets** which return on an annual basis to Troup Head to breed, along with **common guillemots**, **black-legged kittiwakes**, **razorbills** and **Atlantic puffins**. In addition, Noss Head supports the largest known **horse mussel** bed in Scotland.

[231] Historic Environment Scotland (no date): Campania Historic MPA

Scotland's east coast features a diverse array of **marine habitats**, including rocky shores, sandy beaches, and mudflats, which support a rich diversity of marine life. Intertidal areas such as saltmarshes and mudflats provide important breeding grounds for wildlife. The waters around the east coast are home to various fish species, seals, and other marine mammals, making the area ecologically significant.

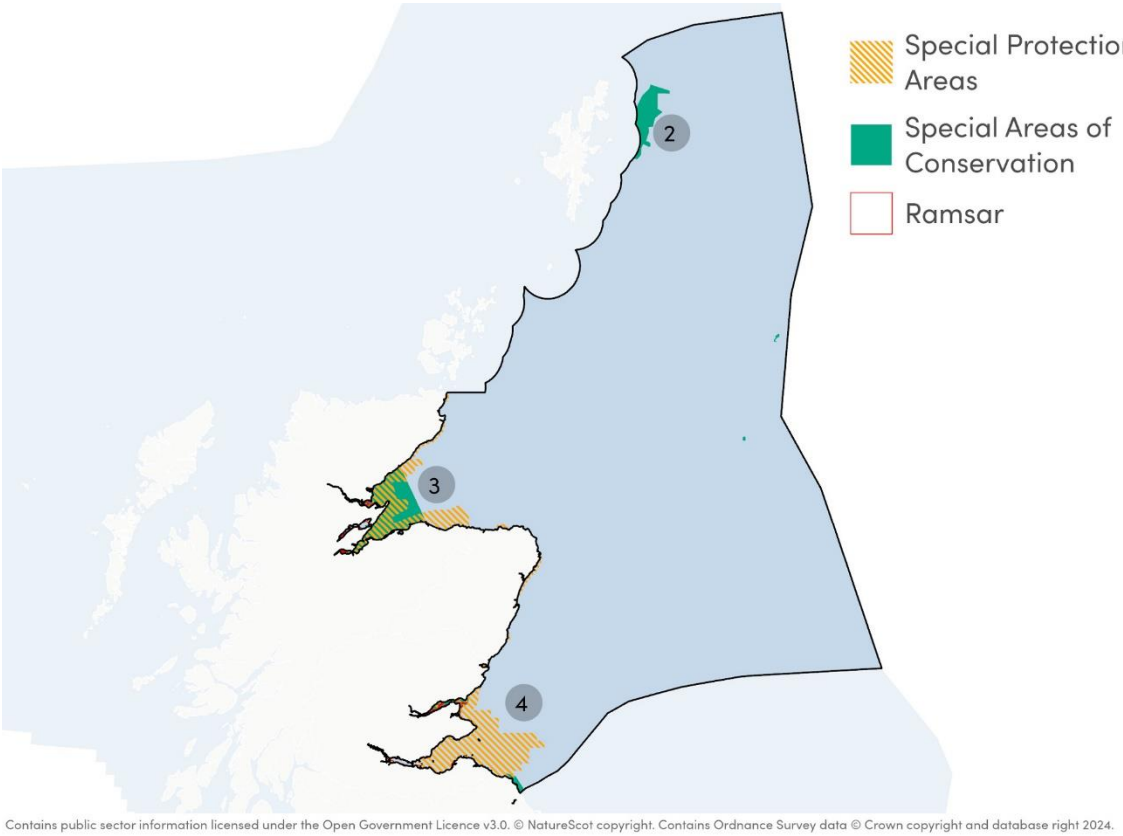

Figure 20.3: Internationally designated sites for biodiversity in Zone M3

A significant proportion of Zone M3 is designated for its biodiversity value. Internationally designated sites for biodiversity – **SACs**, **SPAs** and **Ramsar sites** – in Zone M3, as shown in Figure 20.3 above, include:

- Pobie Bank Reef SAC (**2**)
- Moray Firth SAC and SPA (**3**)
- Outer Firth of Forth and St Andrews Bay Complex SPA (**4**)

Nationally designated sites for biodiversity, including **SSSIs** and **NNRs**, are also located throughout Zone M3 (see Figure 20.4 below). These include (but are not limited to):

- Dornoch Firth SSSI
- Morrich More SSSI
- Cromarty Firth SSSI
- Beauly Firth SSSI
- Culbin Sands, Clubin Forest and Findhorn Bay SSSI
- Inner Tay Estuary SSSI
- Tayport – Tentsmuir Coast SSSI / Tentsmuir NNR

- Firth of Forth SSSI

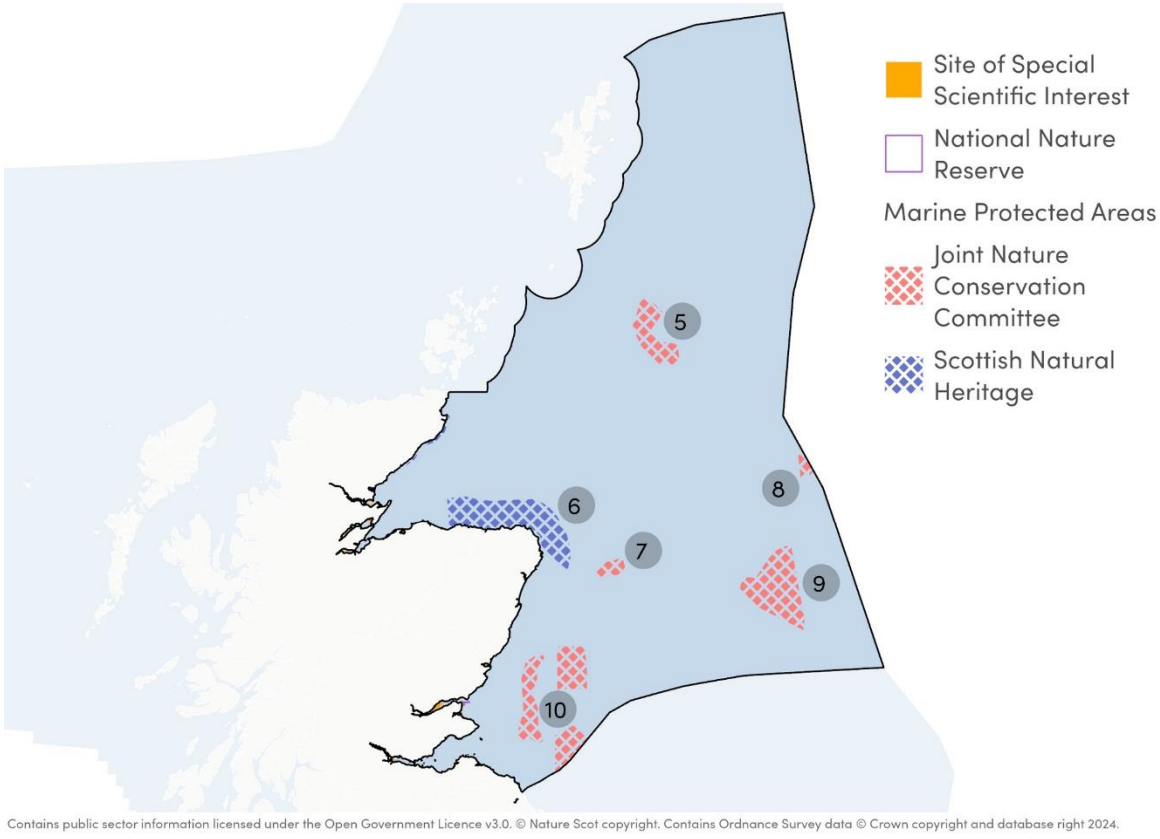

Figure 20.3: Nationally designated sites for biodiversity in Zone M3

MPAs are designed to protect Scotland's seas, marine life and habitats from damage caused by human activities. The Scottish government have designated a network of MPAs covering around 37% of the seas around Scotland. This includes inshore and offshore waters. Zone M3 includes **six MPAs**, which are:

- Central Fladen (**5**)
- The Southern Trench (**6**)
- Turbot Bank (**7**)
- The Norwegian Boundary Sediment Plain (**8**)
- The East of Gannet and Montrose Fields (**9**)
- The Firth of Forth Banks Complex (**10**)

20.7. Land and soil resources

Given the zone is a marine zone, there are no specific elements related to land and soil in this area.

There are no areas currently licensed for marine **aggregate extraction** in Scotland; however, potential mineral resources (including construction aggregate and fill aggregate) have been identified in areas off Scotland's eastern coast.

In recent times, marine aggregate was extracted from two sites of Scotland's east coast: one in the Firth of Forth (last dredged in 2005) and one in the Firth of Tay (last dredged several years before that).[232]

20.8. Landscape and seascape

Zone M3 has a diverse range of seascape types which reflect the interplay of the zone's topography, geology, biodiversity, land uses and cultural heritage.

The seascape of Scotland's east coast is dominated by a series of broad, sweeping **bays**, and gently sloping **beaches**, interspersed with **rocky outcrops** and high **cliffs**. It also includes iconic **estuaries** such as the Dornoch Firth, Cromarty Firth, the Moray Firth, the Tay Estuary and the Firth of Forth.

This region's seascape is shaped by both natural forces and human activity, with **harbours**, **fishing ports**, and areas of significant **cultural heritage** adding to its distinctive character. The coastline contains a number of major **urban areas** including Inverness, Aberdeen, Dundee and Edinburgh.

NSAs are designated to identify Scotland's finest scenery and ensure its protection from inappropriate development. Scotland's east coast is home to **one NSA**: Dornoch Firth, a narrow, winding estuary surrounded by granitic hills, oak woods, plantations, and fertile lands.

20.9. Water

The waters of Scotland's east coast are diverse, with characteristics shaped by tidal movements, wave action, and water quality challenges.

The **tidal range** in Zone M3 generally falls between 1 m and 5 m.[233] This variation in tidal range influences the coastal ecosystems and marine activities in the area.

Waves in Zone M3 tend to be higher by the exposed headlands of the east coast, such as those near Peterhead and John O'Groats, where the coastline juts out into the North Sea (averaging 1.2 – 2 m). In contrast, areas with more sheltered coastlines, such as around Inverness and Edinburgh, experience relatively calmer seas due to the protective influence of the surrounding landmasses and natural bays (reaching <0.5 – 1.2 m). The wave power is notably greater in the winter compared to the summer, reflecting the seasonal variability in marine conditions.[193]

Salinity in the open sea is controlled by the balance between evaporation (fresh water out) and precipitation or run-off from land (fresh water in). In Zone M3, the Moray Firth SMR part of the Zone receives a large freshwater input from the inner firths of Beauly, Cromarty and Dornoch and the river Ness, which influences the salinity of adjacent coastal waters.

Bathing water quality is mixed along Scotland's east coast. Whilst most of the zone's beaches achieved sufficient, good, or excellent status for the 2024 bathing season, three

[232] Marine Scotland Assessment (no date): Aggregates
[233] Scottish Government (2008): Scotland's seas: towards understanding their state

only achieved a poor status: Fisherrow Sands; Kinghorn - Harbour Beach; and Lower Largo).[234]

Nutrient pollution is an issue along the coastline of Zone M3 south of Peterhead, where dissolved inorganic nitrogen concentrations has been recorded to be above background concentrations.[235] Areas with particularly high pollution levels include the coast by Ellon, Arbroath, and North Berwick. This has ecological impacts in these areas, affecting marine life and water quality.

Marine litter is also an issue throughout Zone M3, attributed to tourism, fishing activities, and litter entering UK waters through prevailing currents. Scotland's 2020 Marine Assessment found that the Forth (harbours) area was by far the most polluted area surveyed in Scotland, recording the same amount of litter in that area than the equivalent figure for the five other survey areas combined.[236]

The east coast of Scotland, particularly areas such as Aberdeen and the Moray Firth, has experienced several notable **coastal flooding events** in recent years. These incidents highlight the increasing vulnerability of these areas to extreme weather patterns and rising sea levels, necessitating robust management and adaption/mitigation strategies. A recent example of this was Storm Bert in November 2024, which brought high winds and heavy rain, leading to coastal flooding due to a combination of high tides and large waves. This event caused flooding of coastal roads, paths, and properties near the coast, leading to significant disruption to travel and infrastructure.

20.10. Key issues for Zone M3

The following key issues have been identified through the review of the baseline information for Zone M3:

- Marine data recorded by the Aberdeen tidal gauge indicates that the **sea level** is expected to rise in this zone by 0.37m by 2100, relative to the 1981-2000 average.
- Zone M3 has been identified as having significant potential for **offshore wind energy**. There is also significant carbon capture potential given the presence of infrastructure from the oil and gas industry.
- Communities along Scotland's east coast, particularly those towards the north of the zone, have a rich **maritime heritage**, with many settlements historically relying on the sea for their livelihoods.
- The **fishing industry** is a key economic sector for the communities around the zone with Peterhead being the single largest fishing port in the UK by tonnage and value of landing and one of the busiest in Europe. 181,227 tonnes of fish were landed in 2023. The port is known for its whitefish, including haddock, cod, and whiting, as well as shellfish, such as crab and lobster. Fraserburgh is another key fishing port, with 16,262 tonnes of fish landed in 2023, and is known for its haddock, cod, and whiting, as well as langoustine and crab.

[234] https://bathingwaters.sepa.scot/locations-and-results/
[235] https://marine.gov.scot/maps/1834
[236] Marine Scotland Assessment (no date): Beach litter

- Fraserburgh and the part of the zone within the Ullapool district are also areas with significant **demersal farming** activity including the harvesting of haddock, monkfish and whiting. Other areas of the zone are primarily involved in **shellfish harvesting**, including Aberdeen, Anstruther, Buckie and Eyemouth.
- There are large numbers of **heritage assets** in the immediate vicinity of Zone M3. The settings of many of these assets (and their significance) are heavily influenced by the marine environment. Examples include the Forth Bridge (which is a World Heritage Site), Dunnottar Castle, the city of St Andrews, and Fort George near Inverness. At some locations, coastal erosion is putting heritage assets and levels of access at risk, which may accelerate in the long-term due to climate change and sea level rise.
- Scotland's east coast features a diverse array of **marine habitats**, including rocky shores, sandy beaches, and mudflats, which support a rich diversity of marine life. Intertidal areas such as saltmarshes and mudflats provide important breeding grounds for wildlife. The waters around the east coast are home to various fish species, seals, and other marine mammals, making the area ecologically significant. Reflecting this, a significant proportion of the east of Scotland's coastline is designated for its biodiversity value.
- There are **six MPAs** in the zone.
- **Bathing water quality** is mixed along Scotland's east coast.
- **Nutrient pollution** is an issue along the coastline of Zone M3 south of Peterhead
- **Marine litter** is also an issue throughout Zone M3, attributed to tourism, fishing activities, and litter entering UK waters through prevailing currents

21. Zone M4: North East England

Overview of Zone M4

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for M4

21.1. Overview of Zone M4

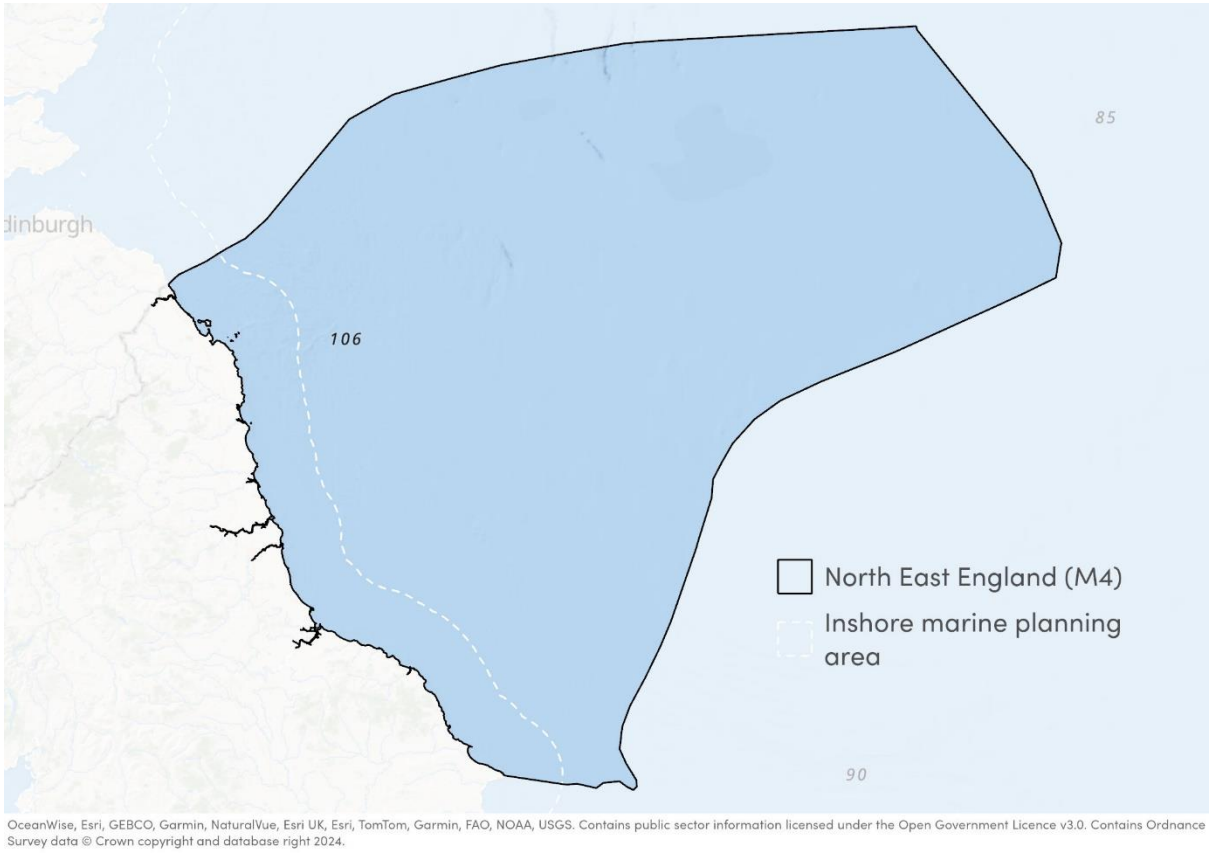

Figure 21.1: Area covered by Zone M4 – North East England

Zone M4 covers the marine area surrounding part of the north east of England, from the Scottish border to Flamborough Head on the Yorkshire coast (see **Figure 21.1** above). It includes the north east inshore and offshore marine plan areas.

The north east inshore marine plan area part of the zone stretches from the Scottish border to Flamborough Head on the Yorkshire coast, taking in a total of approximately **6,000 km²** of sea. Scotland and its marine area border this zone to the north, whilst the east inshore and offshore marine plan areas borders this zone to the south. The area overlaps with 13 local authorities, one National Park, one National Landscape, and one WHS.

The north east offshore marine plan area part of the zone includes the area from 12 nautical miles extending out to the seaward limit of the EEZ, a total of approximately **50,000 km²** of sea. The marine areas of the Scotland, Norway, Denmark, Germany, and the Netherlands border the north east offshore marine plan area.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

21.2. Air quality

There are **two AQMAs** adjacent to the north east inshore area of the zone: AQMA No. 1b in Newcastle City Centre, which was declared due to NO_2, and the Scarborough AQMA, which was declared due to PM_{10} levels.

Port activities and ship-source pollutants can be an issue in some port locations, including relating to NOx, SOx and particulate matter. These are though relatively insignificant, and the main port areas of Tyne, Tees and Blyth have not been designated AQMAs specifically due to port activities.

21.3. Climate change

Impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projects, in the North East of England winters in the 2070s (2061-2080) could be up to 2.91°C warmer and 10.1% wetter, with summers up to 4.47°C hotter and 21.9% drier. Furthermore, in the Yorkshire and Humber region winters in the 2070s (2061-2080) could be up to 2.97°C warmer and 15.8% wetter, with summers up to 4.72°C hotter and 26.7% drier. In terms of the warming of the sea, data indicates there has been a sea surface temperature increase of approximately 0.3°C per decade for the last 40 years around the UK[237].

Mean sea level rise around the UK has been between 12-16cm since 1900[238] and sea level projections to 2300 suggest that UK sea levels will continue to rise over the coming centuries under all RCP climate change scenarios. As highlighted by the Met Office, the UK is locked into accelerated sea level rise over this timeframe regardless of trends in greenhouse gas emissions[239].

UK tide gauge records show substantial year to year changes in coastal water levels[240]. Marine data recorded by the **Whitby tidal gauge** indicates that the sea level is expected to rise in this zone by **0.5m by 2100**[241], relative to the 1981-2000 average[242]. This is based on the RCP4.5 emissions scenario[243]; it is noted that projections of sea level change around the UK can vary substantially by climate change scenario.

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[237] National Oceanography Centre (2023): New report predicts UK oceans to warm by more than three degrees by 2100

[238] Horsburgh, K. et al. (2020): Impacts of climate change on sea-level rise relevant to the coastal and marine environment around the UK

[239] Met Office (2019): UK sea level projections to 2300

[240] Met Office (2018): UKCP18 Marine report

[241] This is the 50th percentile figure and has been selected as it is a stable measurement to evaluate long-term trends.

[242] Met Office (no date): UKCP data

[243] RCP4.5 assumes that global emissions peak around 2040 and then decline, leading to a moderate level of climate change. To achieve this emissions scenario, global climate policies focused on reducing greenhouse gas emissions through technological innovation and sustainable practices will be required. RCP4.5 is often used in climate modelling to assess future climate impacts and to guide policy decisions.

In addition to sea level rise, climate change has resulted in further impacts to ocean systems that have caused irreversible losses in coastal and open ocean marine ecosystems[244]. The ocean acts as a carbon sink; a natural reservoir that absorbs the atmosphere's carbon through physical and biological means. It is estimated that the ocean absorbs approximately 30% of carbon dioxide that is released into the atmosphere; when it is absorbed by seawater, a series of chemical reactions occur which result in ocean acidification[245]. Human-induced climate change has caused further ocean acidification – open ocean surface pH has declined between 0.017–0.027 pH units per decade since the last 1980s[246]. This impacts upon the ecosystems within the ocean, and can have a further impact upon food production due to changes in the distribution and abundance of fish populations. Additionally, climate change has an impact on extreme wave height (linked to coastal erosion and flooding), and marine heat-related events; it is reported that marine heatwaves have doubled in frequency, have become longer lasting, and are more intense. This results in widespread coral bleaching and reef degradation[247] - which can further impact upon the loss of marine biodiversity.

In terms of **climate change mitigation**, offshore wind energy generation is a relatively new development in the north east marine plan areas, for example at Teeside and Blyth. Part of the zone, including off the coast of Newcastle-upon-Tyne and Flamborough Head, has a high potential for the future development of offshore wind.

Future opportunities exist for **carbon capture and storage** using existing oil and gas infrastructure.

21.4. Community wellbeing

The communities that border this zone have a strong maritime heritage and are intrinsically linked to the marine area in Zone M4. Communities are predominantly rural with several urban areas present, including Berwick-upon-Tweed, Tynemouth, South Shields, Sunderland, Hartlepool, Redcar, Whitby, and Scarborough.

This zone includes the **ports** of Tyne, Teesport and Blyth. Several ports are important for **fisheries landings**, such as Blyth, Hartlepool, North Shields and Scarborough. Smaller ports are also important for **shellfisheries landings**, such as Amble, Berwick-upon-Tweed and Seahouses.

The key fishing ports in the zone and the tonnage and value of **fish landed in 2023** is set out in Table 21.1 overleaf.

[244] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[245] NOAA (2020): Ocean acidification
[246] IPCC (2019): Special Report on the Ocean and Cryosphere in a Changing Climate
[247] United Nations (no date): How is climate change impacting the world's ocean

Table 21.1: Tonnage and value of all fish landed in 2023 at important ports for fisheries landings in Zone M4 (source: UK Sea Fisheries Statistics 2023)

Port	Quantity ('000 tonnes)	Main species landed	Value (£ million)
Hartlepool	0.8	Crabs	2.4
North Shields	1.9	Nephrops	6.2
Scarborough	1.0	Crabs	3.4

North Sea oil and gas reserves mean that **oil and gas production** and processing are important activities in the north east marine plan areas, with product being transferred to shore via pipelines, for example at Teesside.

The Northumberland and North Yorkshire coastlines are important for **tourism and recreation** and are highly valued for their dramatic views. Tourism in towns like Scarborough, Whitby, Seahouses and the many villages along the Northumberland coast is important to the local economy. The extensive sandy beaches and consistent wave quality provide numerous recreational activities, such as coasteering, surfing and kite surfing.

21.5. Cultural heritage and historic environment

There are large numbers of **heritage assets** in the immediate vicinity of Zone M4. They include both designated and non-designated heritage assets and include a range of scheduled monuments, listed buildings, registered parks and gardens, and registered battlefields. The settings of many of these assets (and their significance) are heavily influenced by the marine environment.

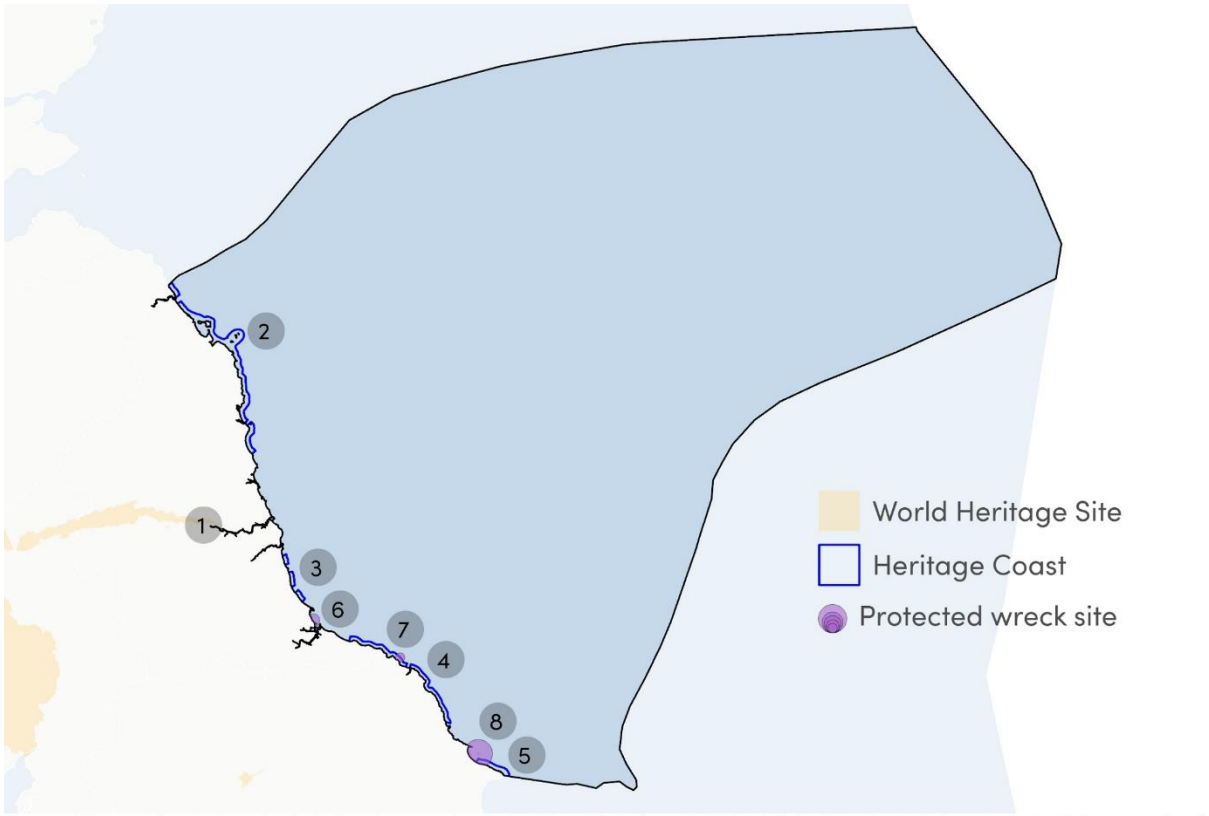

Figure 21.2: Designated heritage assets within Zone M4

A small part of the **Frontiers of the Roman Empire (Hadrian's Wall) WHS** (**1**) (see Figure 21.2 above), at Wallsend, falls within Zone M4.

Heritage coasts have been established to conserve the best stretches of undeveloped coast in England and Wales. A proportion of the coastline of the zone is designated as heritage coast (see Figure 21.2 above). The heritage coasts are North Northumberland (**2**), Durham (**3**), North Yorkshire and Cleveland (**4**), and Flamborough Head (**5**).

Given the location of the zone in the North Sea, and the topography and geomorphology of the coastline, there are significant numbers of sites of **shipwrecks**. Particular clusters of protected wreck sites include off the coast of Tynemouth / South Shields, Hartlepool (**6**), Whitby (**7**), and Scarborough (**8**).

Coastal erosion is putting heritage assets and levels of access at risk, which may accelerate in the long-term due to climate change and sea level rise.

21.6. Ecology and biodiversity

Zone M4 contains a diverse range of **habitats and species**. There are a significant number of statutory designations for protecting the marine environment within and bordering the zone, which are discussed overleaf.

Species in this zone include **sea and river lamprey** in the Tweed estuary. The Aln estuary supports **sand eel**, **flounder** and **European eel**. Further south, Runswick Bay provides important nursery areas for **herring**, **sprat**, **cod**, **whiting** and **plaice**.

Breeding and overwintering birds migrate through, feed and roost within the inshore and offshore plan areas. The Farne Islands, Coquet Island and Holy Island support thousands of breeding and overwintering birds. Holy Island provides the only overwintering location in the UK for the Svalbard population of **pale-bellied brent geese**. **Little tern** breed on the beaches of the Teesmouth and Cleveland coast, and significant numbers of **sandwich tern** pass through this area on migration. In summer months, the cliffs of Bempton Cliffs are packed with tens of thousands of breeding **auks**, **gannets**, **gulls** and **puffins**.

Charismatic species including **grey seal**, including breeding colonies at the Farne Islands and Ravenscar, **harbour porpoise** and **minke whale** can be found through the inshore plan area, and **white-beaked dolphin** can be found in the shallow inshore waters of Northumberland.

Priority habitats along the coastline include maritime cliff and slope, mudflats, coastal sand dunes, coastal and floodplain grazing marsh, coastal saltmarsh, good quality semi-improved grassland, lowland calcareous grassland, lowland fens, lowland dry acid grassland, lowland meadows, purple moor grass and rush pastures, reedbeds, saline lagoons, lowland heathland, deciduous woodland, and wood-pasture and parkland.

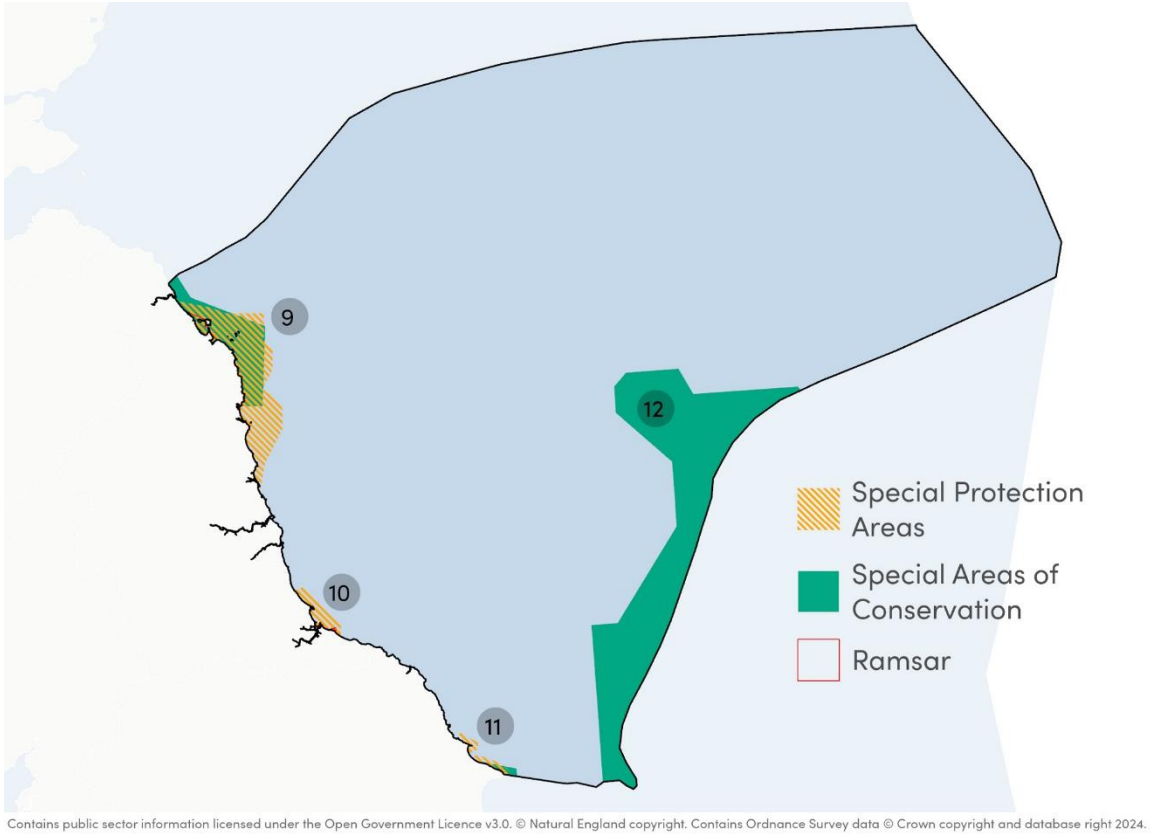

Figure 21.3: Internationally designated sites for biodiversity in Zone M4

A significant proportion of Zone M4 is designated for its biodiversity value. Internationally designated sites for biodiversity – **SACs**, **SPAs** and **Ramsar sites** – in Zone M4, as shown in Figure 21.3 above, include:

- Berwickshire & North Northumberland Coast SAC (**9**)
- Teesmouth and Cleveland Coast Ramsar site (**10**)

- Flamborough and Filey Coast SPA (**11**)
- Southern North Sea SAC (**12**)

Nationally designated sites for biodiversity, including **SSSIs** and **NNRs**, are also located throughout Zone M4 (see Figure 21.4 below). These include (but are not limited to):

- Lindisfarne SSSI (**13**)
- Teesmouth and Cleveland Coast SSSI (**14**)

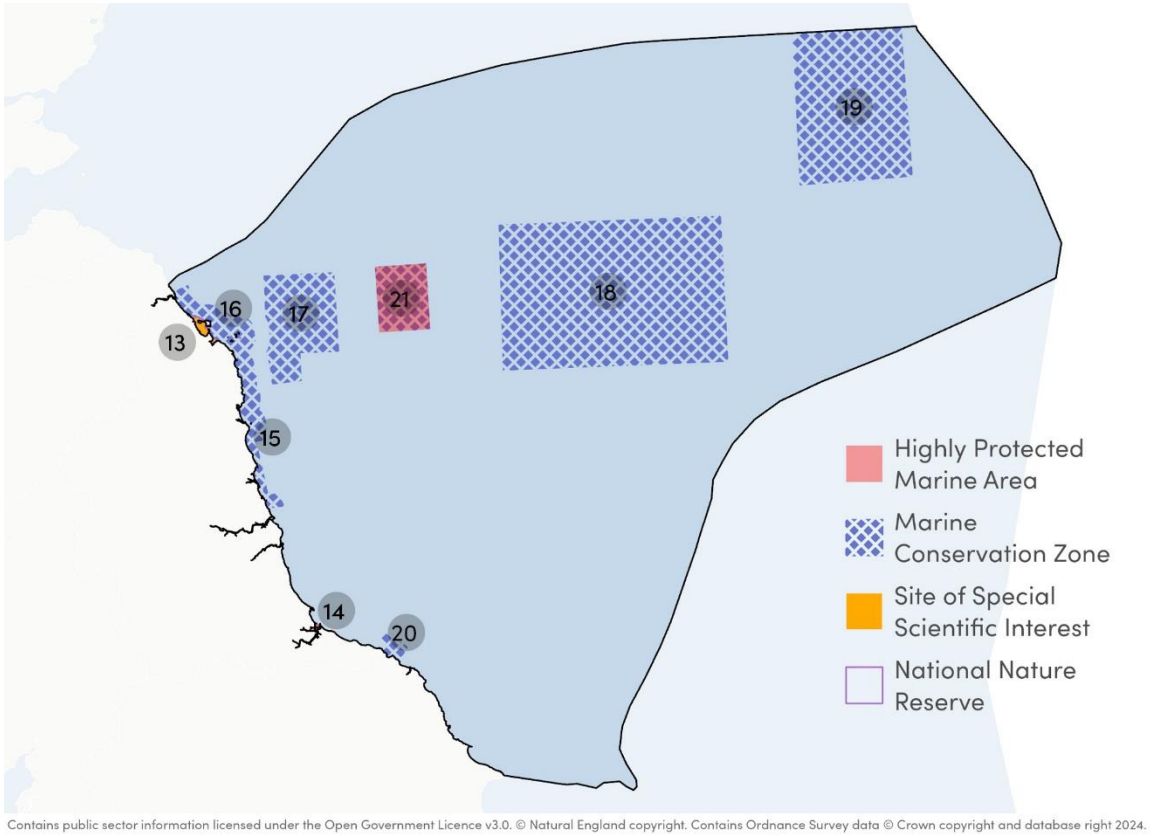

Figure 21.4: Nationally designated sites for biodiversity in Zone M4

Zone M4 contains **six Marine Conservation Zones (MCZs)** (see Figure 21.4 above), which are:

- Coquet to St Mary's (**15**)
- Berwick to St Mary's (**16**)
- Farnes East (**17**)
- Swallow Sand (**18**)
- Fulmar (**19**)
- Runswick Bay (**20**)

Highly Protected Marine Areas (HPMAs) are areas of the sea (including the shoreline) that allow the protection and full recovery of marine ecosystems. By setting aside some areas of sea with high levels of protection, HPMAs will allow nature to fully recover to a more natural state, allowing the ecosystem to thrive. There is **one HPMA** in Zone M4 (see Figure 21.4 above), which is:

- **North East of Farnes Deep** (**21**) is designated for its seabed, which has a mix of highly mosaiced habitats ranging from coarse sediments such as sand, where several species of filter feeding sponges have been identified, through to mixed sediment areas and mud dominated seabed habitats.[248] These wide-ranging, mostly stable habitats support high levels of biodiversity in comparison to the wider Northern North Sea region, with at least 263 benthic and demersal species recorded. These include the phosphorescent sea pen, common dragonet, and squat lobsters which occur in relatively large numbers across the area, as well as the long-lived ocean quahog, a type of mollusc which is under threat across the broader North-east Atlantic. Several mobile species have been recorded in this area, including the rare and regionally distinctive European smelt, which is prey for larger fish, seabirds and marine mammals. At least seven nationally important seabird species and five marine mammal species have also been recorded within this area including the harbour porpoise and white beaked dolphin.

21.7. Land and soil resources

Given the zone is a marine zone, there are no specific elements to highlight for this theme relating to Zone M4. However, the only **marine potash mine** in England is located in the north east inshore marine plan area in North Yorkshire.

21.8. Landscape and seascape

Seascapes and landscapes in the north east marine plan areas have changed over the centuries through the introduction of early Christianity at Lindisfarne, Viking incursions and the diverse historic buildings lining the Northumberland Coast such as Bamburgh Castle. To the south the views to and from the North York Moors and the cliffs at Scarborough are most notable.

More recently, extensive industrial activity, including coal mining, ship building on the Tyne and Wear, car manufacturing on Wearside, and petro-chemicals on the Tees, has shaped the character of the area. The changing nature of these areas has led to an increase in service sector employment and development of new energy technology. The changing seascape and landscapes have adapted to **reclaim rivers and beaches** for more social and recreational uses.

The zone is significant for shallow depth submerged **prehistoric landscapes**. Visually, the prevalence of protected landscapes are important for their identity and their association with tourism and recreation activities.

The Seascape Character Assessment for the north east inshore and offshore marine plan areas[249] identifies **nine MCAs in the north east inshore and offshore marine plan area**: North Yorkshire Coastal Waters, Tyne, Tees and Wear Estuaries and Coastal Waters, Rural

[248] UK Government (2023): Highly Protected Marine Areas: North East of Farnes Deep
[249] Marine Management Organisation (2018): Seascape Character Assessment for the North East Inshore and Offshore marine plan areas

Northumberland and Coastal Waters, Breagh Oil and Gas Field, Farne Deeps, Berwick Bank, Dogger Bank Edge, Swallow Hole Plain, and North Sea Oil and Gas Field.

The Northumberland Coast **National Landscape** lies adjacent to the zone, to the south of Berwick-upon-Tweed. The North York Moors **National Park** also lies adjacent to this zone, either side of Whitby.

21.9. Water

The zone has **seven beaches** with **blue flag status**, which can be attributed to high water quality and good management. There are approximately **44 classified bathing beaches** in the zone, with approximately 93% achieving either sufficient, good or excellent status. Locations where the latest (2024) classification is 'poor' water quality or otherwise 'bathing is not advised' include Tynemouth Cullercoats, Littlehaven Beach, and Scarborough South Bay.

There are a number of challenges to maintaining good **water quality** in this zone, notably the increased run-off from agricultural land; the discharges of heavy metals and other pollutants from abandoned mines and industrial facilities; diffused pollution; and management of waste water from the large catchment areas of the Tyne and Tees and Sunderland. All the above can also be exacerbated by periods of heavy rainfall, which can put pressure on the sewage systems, resulting in combined sewer overflows operating more frequently. Heavy rainfall is also more likely to flush pollutants from agricultural and urban land into rivers and the sea.

With regard to **marine litter**, there is a higher-than-average concentration of sewage related debris and public litter in the north east inshore marine plan area.

In the last ten years there have been significant **coastal flood events** in this period which have impacted on the region, including in January 2017 when a North Sea storm surge hit Whitby. High tide reached 5.8m combined with waves up to 6.7m off the coast of the town.[250]

As highlighted in the Northumbria[251] River Basin District River Basin Management Plan, particular **challenges facing the water environment** relevant to coastal areas include: climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

21.10. Key issues for Zone M4

The following key issues have been identified through the review of the baseline information for Zone M4:

[250] Surge Watch (no date): Storm Event: 13th January 2017

[251] UK Government (2022): Northumbria River Basin District River Basin Management Plan

- Marine data recorded by the Whitby tidal gauge indicates that the **sea level** is expected to rise in this zone by 0.5m by 2100, relative to the 1981-2000 average.
- Part of the zone, including off the coast of Newcastle-upon-Tyne and Flamborough Head, has a high potential for the future development of **offshore wind**.
- North Sea oil and gas reserves mean that **oil and gas production** and processing are important activities in the north east marine plan areas, with product being transferred to shore via pipelines, for example at Teesside. Future opportunities exist for carbon capture and storage using existing oil and gas infrastructure.
- This zone includes the ports of **Tyne**, **Teesport** and **Blyth**. Several ports are important for fisheries landings, such as Blyth, Hartlepool, North Shields and Scarborough. Smaller ports are also important for shellfisheries landings, such as Amble, Berwick-upon-Tweed and Seahouses.
- There are significant numbers of sites of **shipwrecks**. Particular clusters of protected wreck sites include off the coast of Tynemouth / South Shields, Hartlepool, Whitby, and Scarborough.
- A significant proportion of the north east coastline is designated for its **biodiversity** value.
- There are **seven MPAs** located in Zone M4.
- The **North East of Farnes Deep** Highly Protected Marine Area is designated for its seabed habitats. These wide-ranging, mostly stable habitats support high levels of biodiversity in comparison to the wider northern North Sea region,
- Breeding and overwintering **birds** migrate through, feed and roost within the inshore and offshore parts of the zone. The Farne Islands, Coquet Island and Holy Island support thousands of breeding and overwintering birds.
- The zone is significant for shallow depth submerged **prehistoric landscapes**.
- There are a number of challenges to maintaining good **water quality** in this zone, notably the increased run-off from agricultural land; the discharges of heavy metals and other pollutants from abandoned mines and industrial facilities; diffuse pollution; and management of waste water from the large catchment areas of the Tyne and Tees and Sunderland.
- With regard to **marine litter**, there is a higher-than-average concentration of sewage related debris and public litter in the north east inshore marine plan area.

22. Zone M5: East England

Overview of Zone M5

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for M5

22.1. Overview of Zone M5

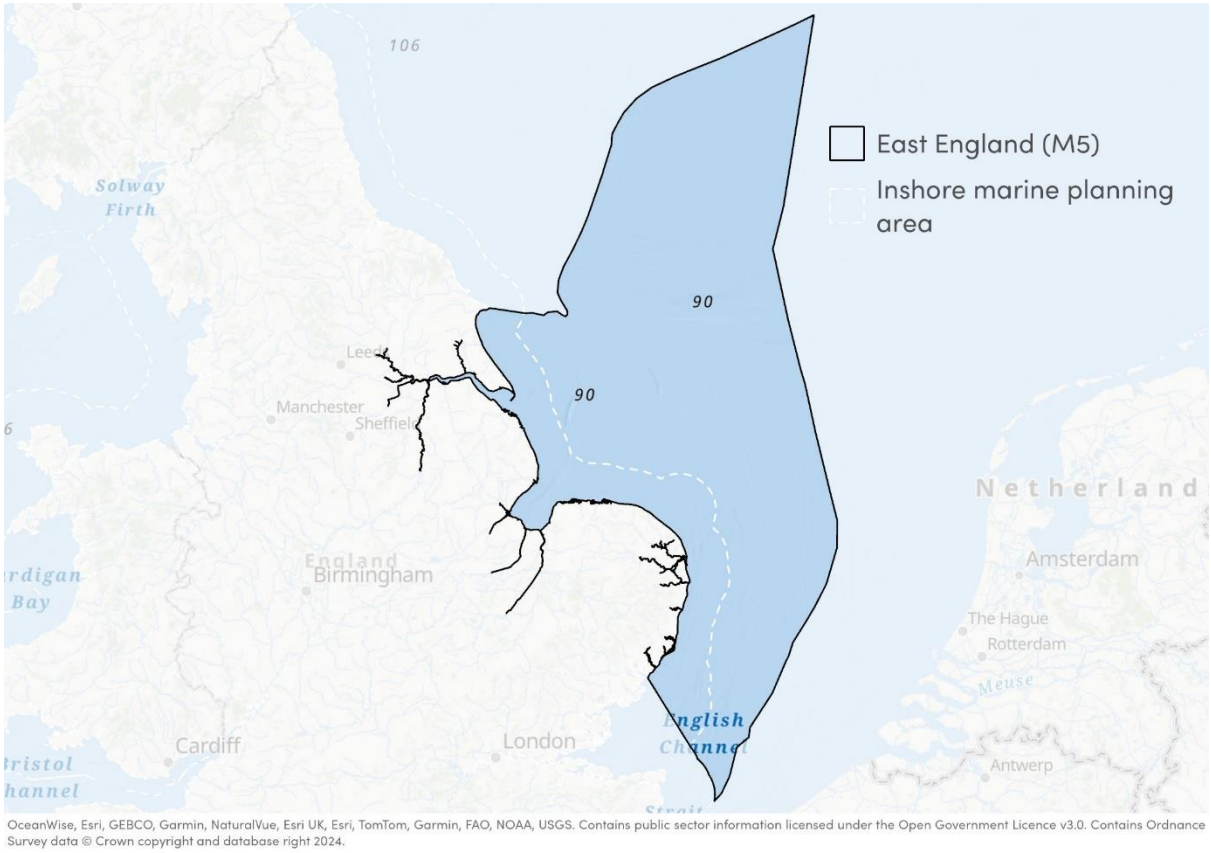

Figure 22.1: Area covered by Zone M5 – East England

Zone M5 covers the marine area adjacent to the East Riding of Yorkshire, Lincolnshire and the East of England (see Figure 22.1 above). It extends from Flamborough Head on the Yorkshire coast to Felixstowe in East Suffolk and includes the east inshore and offshore marine plan areas.

The east inshore marine plan area part of the zone incorporates the coastline stretching from the Flamborough Head on the Yorkshire coast to Felixstowe in East Suffolk, taking in a total of approximately **6,000 km²** of sea. The north east inshore and offshore marine plan area borders this zone to the north, whilst the south east inshore marine plan area borders this zone to the south. The area overlaps with 26 local authorities, one National Park and two National Landscapes.

The east offshore marine plan area part of the zone includes the area from 12 nautical miles extending out to the seaward limit of the EEZ, a total of approximately **49,000 km²** of sea. The marine areas of the Netherlands, Belgium and France border the east offshore marine plan area.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

22.2. Air quality

There are **ten AQMAs** adjacent to the east inshore area of the zone, most declared for NO_2 levels.

Port activities and ship-source pollutants can be an issue in some port locations, including relating to NOx, SOx and particulate matter. These are though relatively insignificant, and neither of the main port areas of Grimsby and Immingham are designated AQMAs due to port activities.

22.3. Climate change

Impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projects, in the Yorkshire and Humber region winters in the 2070s (2061-2080) could be up to 2.97°C warmer and 15.8% wetter, with summers up to 4.72°C hotter and 26.7% drier. Additionally, in the East Midlands region winters in the 2070s (2061-2080) could be up to 3°C warmer and 18.2% wetter, with summers up to 5.1°C hotter and 31.3% drier; and in the East of England region winters in the 2070s (2061-2080) could be up to 3.1°C warmer and 17% wetter, with summers up to 5.1°C hotter and 31.3% drier. In terms of the warming of the sea, data indicates there has been a sea surface temperature increase of approximately 0.3°C per decade for the last 40 years around the UK[252].

Mean sea level rise around the UK has been between 12-16cm since 1900[253] and sea level projections to 2300 suggest that UK sea levels will continue to rise over the coming centuries under all RCP climate change scenarios. As highlighted by the Met Office, the UK is locked into accelerated sea level rise over this timeframe regardless of trends in greenhouse gas emissions[254].

UK tide gauge records show substantial year to year changes in coastal water levels[255]. Marine data recorded by the **Lowestoft tidal gauge** indicates that the sea level is expected to rise in this zone by **0.57m by 2100**[256], relative to the 1981-2000 average[257]. This is based on the RCP4.5 emissions scenario[258]; it is noted that projections of sea level change around the UK can vary substantially by climate change scenario.

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[252] National Oceanography Centre (2023): New report predicts UK oceans to warm by more than three degrees by 2100

[253] Horsburgh, K. et al. (2020): Impacts of climate change on sea-level rise relevant to the coastal and marine environment around the UK

[254] Met Office (2019): UK sea level projections to 2300

[255] Met Office (2018): UKCP18 Marine report

[256] This is the 50th percentile figure and has been selected as it is a stable measurement to evaluate long-term trends.

[257] Met Office (no date): UKCP data

[258] RCP4.5 assumes that global emissions peak around 2040 and then decline, leading to a moderate level of climate change. To achieve this emissions scenario, global climate policies focused on reducing greenhouse gas emissions through technological innovation and sustainable practices will be required. RCP4.5 is often used in climate modelling to assess future climate impacts and to guide policy decisions.

In addition to sea level rise, climate change has resulted in further impacts to ocean systems that have caused irreversible losses in coastal and open ocean marine ecosystems[259]. The ocean acts as a carbon sink; a natural reservoir that absorbs the atmosphere's carbon through physical and biological means. It is estimated that the ocean absorbs approximately 30% of carbon dioxide that is released into the atmosphere; when it is absorbed by seawater, a series of chemical reactions occur which result in ocean acidification[260]. Human-induced climate change has caused further ocean acidification – open ocean surface pH has declined between 0.017–0.027 pH units per decade since the last 1980s[261]. This impacts upon the ecosystems within the ocean, and can have a further impact upon food production due to changes in the distribution and abundance of fish populations. Additionally, climate change has an impact on extreme wave height (linked to coastal erosion and flooding), and marine heat-related events; it is reported that marine heatwaves have doubled in frequency, have become longer lasting, and are more intense. This results in widespread coral bleaching and reef degradation[262] - which can further impact upon the loss of marine biodiversity.

In terms of **climate change mitigation**, the east offshore marine plan area of the zone contains 37% (or 1.1 GW) of offshore wind energy capacity currently operational or under construction in English waters. Offshore renewables, specifically **offshore wind farms**, is likely to be the most transformational activity in this zone over the next 20 years. The role of offshore wind energy projects as a transformational activity has been highlighted through national initiatives such as the Centres for Offshore Renewable Engineering[263], of which the East Inshore marine plan area contain two, (Great Yarmouth and Lowestoft, and the Humber) and also through the plans of Local Enterprise Partnerships in the marine plan areas[264], which identify the economic priorities of local areas.

The east offshore area of the zone represents one of the largest opportunities for **carbon capture and storage** development across England. This is as a result of the concentration of the majority of the Bunter Sandstone formation aquifers and the existing oil and gas infrastructure, as well as opportunities for storage (with some in the inshore area too).

22.4. Community wellbeing

The communities that border this zone have a strong maritime heritage and are intrinsically linked to the marine area in Zone M5. Several urban areas are present, including Kingston-upon-Hull, Cleethorpes, Skegness, Hunstanton, Wells-next-the-Sea, Sheringham / Cromer, Caister-on-Sea / Great Yarmouth / Gorleston-on-Sea, Lowestoft, and Felixstowe.

[259] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[260] NOAA (2020): Ocean acidification
[261] IPCC (2019): Special Report on the Ocean and Cryosphere in a Changing Climate
[262] United Nations (no date): How is climate change impacting the world's ocean
[263] UK Government (2011): Centres for Offshore Renewable Engineering
[264] UK Government (various): Local Enterprise Partnerships (LEPs) and Enterprise Zones

This zone includes **22% of ports** (by number) in England. The Humber estuary, located in the north of the zone, hosts the UK's busiest port cluster (in 2011[265]), Grimsby and Immingham, handling 12% of the UK's traffic, with up to 40,000 ship movements per year. The port of Felixstowe in Suffolk, adjacent to the inshore marine plan areas' southern boundary, is the largest container port in the UK, handling through traffic of 1.98 million containers per year.[266]

This zone is also important for shellfish harvesting, with fishing activities primarily targeting crabs and cod along the Yorkshire and Lincolnshire coasts and a mix of shellfish species further south. There are also specialist inshore fisheries for cockles and other molluscs in the Wash.

The key fishing ports in the zone and the tonnage and value of **fish landed in 2023** is set out in Table 22.1 overleaf.

Table 22.1: Tonnage and value of all fish landed in 2023 at important ports for fisheries landings in Zone M5 (source: UK Sea Fisheries Statistics 2023)

Port	Quantity ('000 tonnes)	Main species landed	Value (£ million)
Hull	4.4	Cod	9.7
Grimsby	7.1	Scallops	12
Bridlington	2.4	Crabs	11.4
Kings Lynn	1.4	Cockles	3.5
Wells	0.8	Whelks	1.6

Certain localities bordering the zone, such as Great Yarmouth, Lowestoft, Hull, East Yorkshire, North and North East Lincolnshire and Grimsby, have identified **offshore wind energy** projects as a significant driver of growth and regeneration in their area. Some places, such as Wells next-the-Sea, have already experienced economic benefit from the deployment of offshore wind infrastructure.

The Suffolk Coast is also home to the Sizewell **nuclear power plant**, where a third facility, Sizewell C, has been proposed for development adjacent to the existing site, aiming to supply low carbon energy for up to 5 million homes[267], with potential to bring social and economic benefits to the area. Sizewell C aims to offer 900 jobs linked directly to the completed site, whilst a significant number of other jobs will be generated as a result of companies in the area supporting the development[268], during and post construction.

The east offshore marine plan area of the zone supports **oil and gas platforms** and **commercial activities** such as shipping, aggregate extraction and fishing. The area contains 39% of the oil and gas licence blocks in England and accounts for 27% of the area

[265] Department for Transport (2011): Port Freight Statistics
[266] Ibid.
[267] EDF Energy (no date): Sizewell C
[268] Ibid.

licensed for aggregate extraction in English waters. Designated shipping routes, cables infrastructure, and oil and gas pipelines cross the offshore area linking the UK mainland with Europe. The zone has almost 20% of the **submarine cables** in English waters (second only to the South West areas in volume), with a high traffic value and anticipated growth.

Any area of UK waters can be used for **military defence activities** and such activities differ across the marine plan areas. The east marine plan areas are specifically significant for practice of air-to-air combat manoeuvres, bombing, and submarine exercises off Flamborough Head. There are also a number of air bases located close to the coast with associated air traffic radars.

Employment opportunities in the **tourism and recreation** industry are found in a number of locations such as Bridlington, Great Yarmouth, Hunstanton, Cleethorpes and Skegness. There are many marinas, training and racing areas in the zone and wildlife watching is becoming an increasingly popular activity for visitors to the East of England.[269] In this respect the coast is a key tourism draw for the zone.

Leisure boating, which is the most popular sector of the marine water sports industry, is popular in the zone, which includes many marinas and Royal Yachting Association training and racing areas. These areas are clustered around the Broads in Norfolk and Suffolk coastlines and estuaries, and to a lesser extent, the estuaries in the Wash and Humber. The inshore area is also used for other recreational activities, such as sea angling.

22.5. Cultural heritage and historic environment

There are large numbers of **heritage assets** in the immediate vicinity of Zone M5. They include both designated and non-designated heritage assets and include a range of scheduled monuments, listed buildings, registered parks and gardens, and registered battlefields. The settings of many of these assets (and their significance) are heavily influenced by the marine environment.

[269] Uk Government (2014): East marine plan areas: Evidence and Issues Report

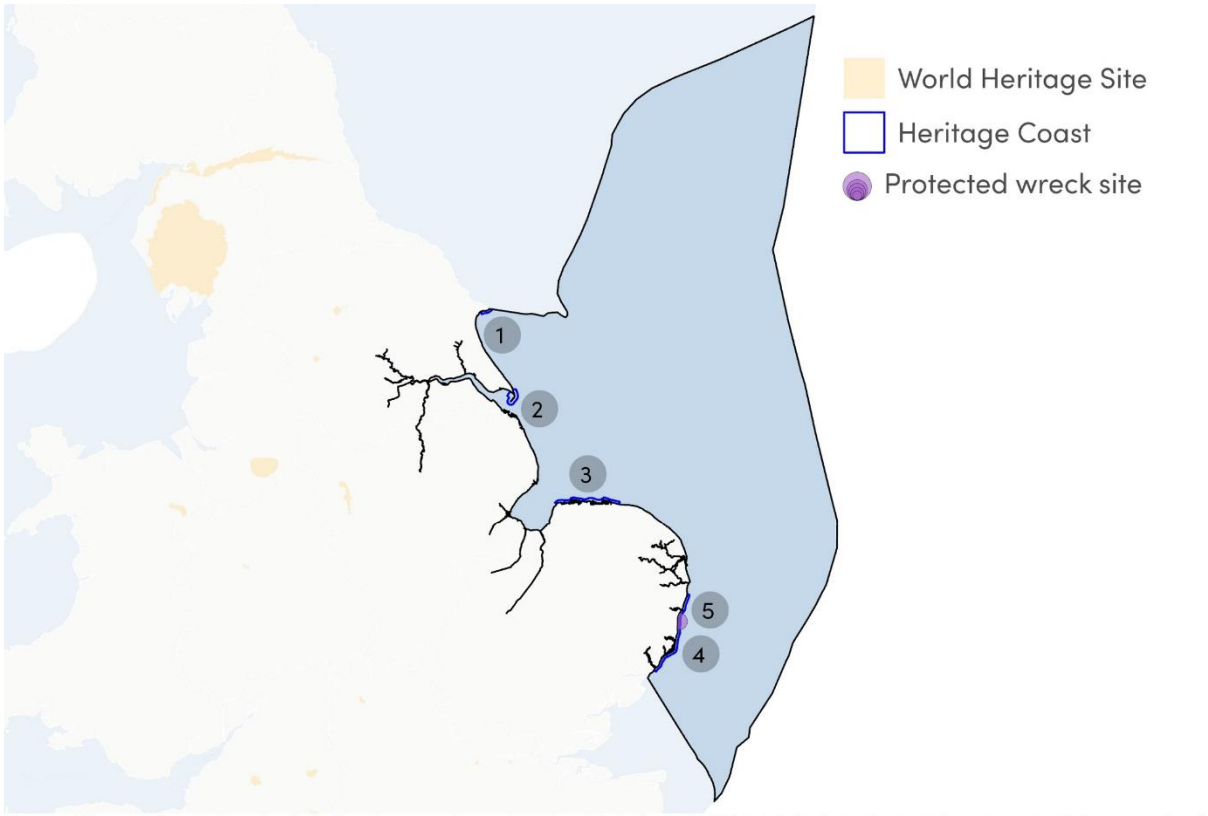

Figure 22.2: Designated heritage assets within Zone M5

Heritage coasts have been established to conserve the best stretches of undeveloped coast in England and Wales. A proportion of the coastline of the zone is designated as heritage coast (see Figure 22.2 above). The heritage coasts are Flamborough Headland (**1**), Spurn (**2**), North Norfolk (**3**), and Suffolk (**4**).

In terms of **archaeology**, there is an abundance and variety of archaeological remains in the offshore area of the zone. In locations such as the **Dogger Bank**, the potential exists to discover evidence of prehistoric activity in areas that were once on land during the last ice age. In this respect the area referred to as 'Doggerland' is particularly rich in Mesolithic remains. In other locations across the offshore area discoveries of early human remains have been prevalent. The receding of the coastline in locations such as Spurn Head and north Norfolk are also revealing significant archaeological finds. For example some of the UK's earliest Palaeolithic finds were identified near Happisburgh dating from c.950,000 BCE, which are important to understanding of prehistoric Europe, and significant Roman and Anglo-Saxon artifacts have been found near Holderness.

Given the location of the zone in the North Sea, and the topography and geomorphology of the coastline, there are significant numbers of sites of **shipwrecks**. Particular clusters of protected wreck sites include off the coast of Flamborough Head, in and in the vicinity of The Humber Estuary, and off the Norfolk and Suffolk (**5**) coasts (see Figure 22.2 above).

Coastal erosion is putting heritage assets and levels of access at risk, which may accelerate in the long-term due to climate change and sea level rise.

22.6. Ecology and biodiversity

Zone M5 contains a diverse range of habitats and species. There are a significant number of statutory designations for protecting the marine environment within and bordering the zone, which are discussed overleaf.

Breeding populations of many of the **seabirds** that are known to breed in the UK can be found in this zone. Wide ranging mobile species include many sea and waterbirds, e.g. foraging species such as **kittiwakes** and **red-throated diver**, cetaceans such as **harbour porpoise**, **white-beaked dolphin**, **Atlantic white-sided dolphin**, and **minke whale**. In addition, the largest colony of **common seals** in Europe occurs around the Wash, and at Donna Nook, there is one of the largest breeding colonies of **grey seals** in the UK.

Shallow waters and sandbanks provide important wildlife habitats and **spawning grounds** for many species and the area is rich in wildlife. 56% of the east offshore area is defined as a high intensity spawning area for **plaice**, with over 33% high intensity spawning areas for **sand eels** and **whiting**, and over 11% high intensity **nursery ground** for **cod** (mainly offshore but with some high intensity cod, sole and plaice spawning grounds continuing inshore).[270] It is therefore an important area to support fish stocks and sustainable commercial fisheries.

Seabed habitats are predominantly sedimentary but with scattered examples of hard substratum or **reef-like habitats**, such as chalk around Flamborough Head and the north Norfolk coast, or Ross worm reefs off East Anglia.

The Humber receives large inputs of suspended sediment from the North Sea, the Holderness Coast and from the rivers flowing into the estuary. This material is critical to many of the designated habitats within the estuary such as mudflats and saltmarsh.

The Wash is England's largest tidal embayment fed by multiple tidal rivers. The landscape is extremely low lying, containing areas of intertidal sand bank, mudflat and saltmarsh which are internationally important for wildlife habitats, migrating waterfowl and shellfish breeding grounds.

Priority habitats along the coastline include maritime cliff and slope, saline lagoons, coastal sand dunes, coastal and floodplain grazing marsh, coastal saltmarsh, mudflats, reedbeds, lowland fens, good quality semi-improved grassland, coastal vegetated shingle, and lowland meadows.

A significant proportion of Zone M5 is designated for its biodiversity value. The east inshore area includes **11%** (by area) of England's **SACs** and **29%** of England's **SPAs** and is home to important **Ramsar sites**. In addition, 35% of the east offshore area is designated as SACs, including a large Site of Community Importance (SIC), the Dogger Bank, and 1% of the offshore area is designated as SPAs.

[270] UK Government (2014): East marine plan areas: Evidence and Issues Report

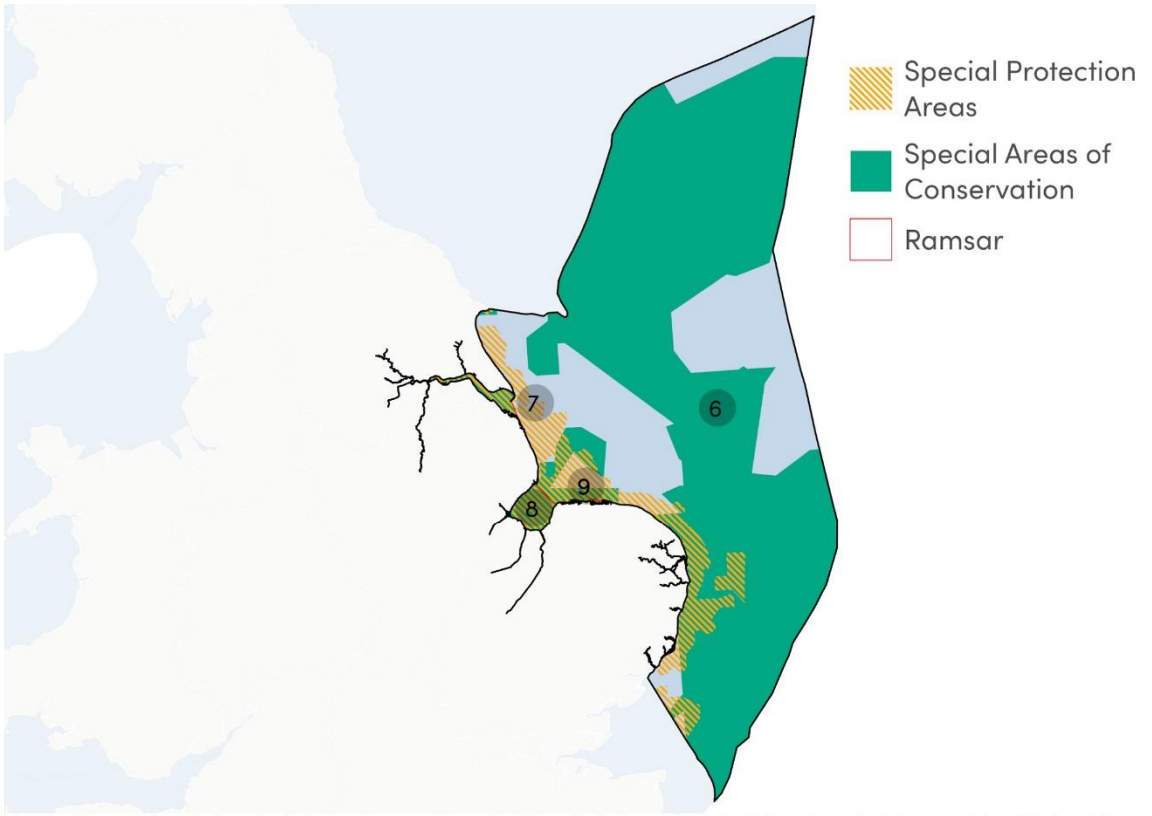

Figure 22.3: Internationally designated sites for biodiversity in Zone M5

A significant proportion of Zone M5 is designated for its biodiversity value. Internationally designated sites for biodiversity – **SACs**, **SPAs** and **Ramsar sites** – in Zone M5, as shown in Figure 22.3 above, include:

- Southern North Sea (**6**)
- The Humber Estuary (**7**)
- The Wash (**8**)
- North Norfolk Coast (**9**)

Nationally designated sites for biodiversity, including **SSSIs** and **NNRs**, are also located throughout Zone M5 (see Figure 22.4 below). These include (but are not limited to):

- The Humber Estuary (**10**)
- The Wash (**11**)

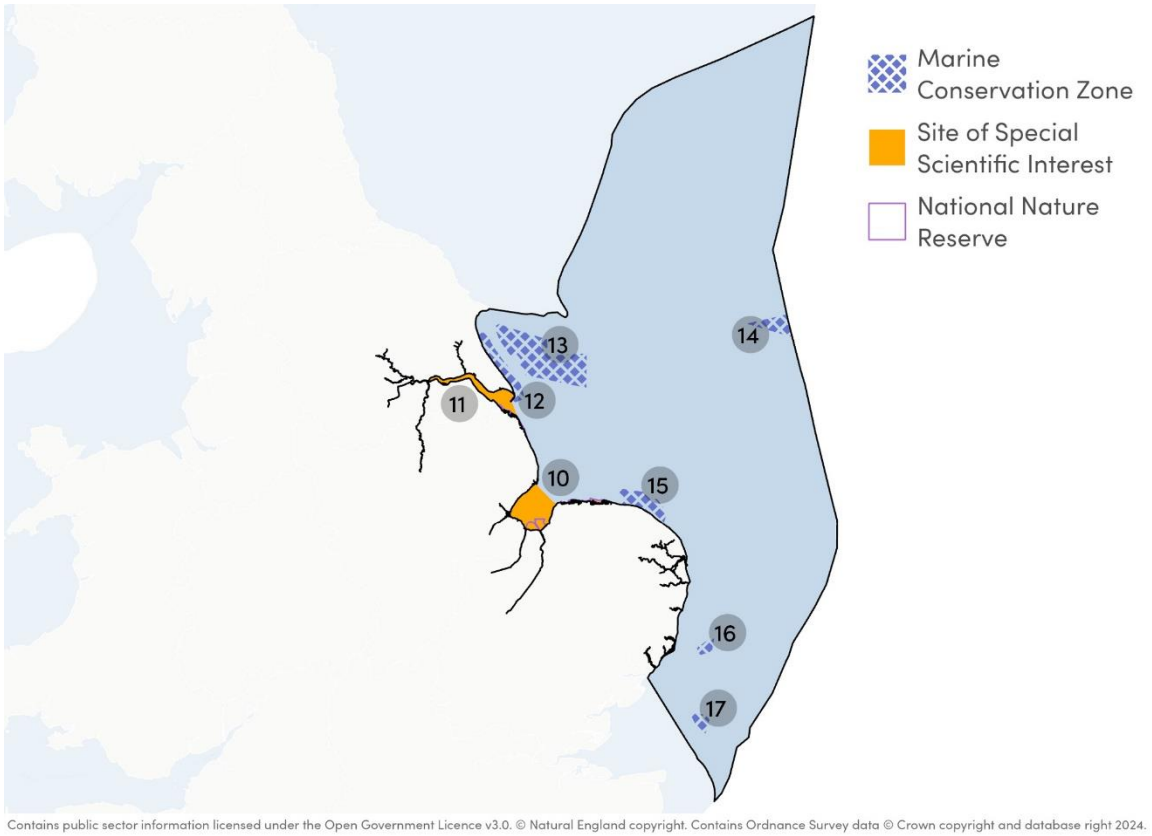

Figure 22.3: Nationally designated sites for biodiversity in Zone M5

Zone M5 contains **six MCZs** (as shown in Figure 22.3 above), which are:

- Holderness Inshore (**12**)
- Holderness Offshore (**13**)
- Markham's Triangle (**14**)
- Cromer Shoal Chalk Beds (**15**)
- Orford Inshore (**16**)
- Kentish Knock East (**17**)

22.7. Land and soil resources

Given the zone is a marine zone, there are no specific elements to highlight for this theme relating to Zone M5. However, 40% of the east inshore area is licensed for **aggregate extraction** in English waters.

22.8. Landscape and seascape

The zone ranges from expansive open shallow water on the Dogger Bank to colourful seafront towns with bustling tourism and recreation activities along the Suffolk coast. There are extensive areas of undeveloped coastline along the east coast which add to the character of the area, such as saltmarsh and lowland heath. The prevailing low-lying topography of the zone means that many onshore locations are at risk of coastal erosion.

The Seascape Character Assessment for the east marine plan areas[271] identifies **ten MCAs in the east inshore and offshore marine plan areas**: Dogger Bank, Dogger Deep Water Channel, East Midlands Offshore Gas Fields, East Anglian Shipping Waters, Holderness Coastal Waters, Humber Waters, East Midlands Coastal Waters, The Wash, Norfolk Coastal Waters, and Suffolk Coastal Waters.

Two **National Landscapes** lie within or adjacent to the zone, which are the Norfolk Coast and the Suffolk Coast & Heaths. The Broads **National Park** also covers part of the coastline to the north of Caister-on-Sea. The boundaries of these designations generally extend to mean low water spring tide, meaning that they physically overlap with the zone and could therefore be impacted by marine development.

22.9. Water

The zone has **10 beaches** with **blue flag status**, which can be attributed to high water quality and good management. There are approximately **41 classified bathing beaches** in the zone, with approximately 93% achieving either sufficient, good or excellent status. Locations where the latest (2024) classification is 'poor' water quality or otherwise 'bathing is not advised' include Bridlington South Beach, Sutton-on-Sea, and Heacham.

In the last ten years there have been some **coastal flood events** in this period which have impacted on key transport infrastructure in the region, including along the Humber in December 2013, where flooding was caused by a tidal surge. Significant coastal change (including coastal erosion) is taking place locations such as Spurn Head, the coastline of north east Norfolk and the Suffolk coast.

As highlighted in the Anglian[272] and Humber[273] River Basin District River Basin Management Plans, particular **challenges facing the water environment** relevant to coastal areas include: climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

22.10.Key issues for Zone M5

The following key issues have been identified through the review of the baseline information for Zone M5:

- Marine data recorded by the Lowestoft tidal gauge indicates that the **sea level** is expected to rise in this zone by 0.57m by 2100, relative to the 1981-2000 average.
- Offshore renewables, specifically **offshore wind** farms, is likely to be the most transformational activity in this zone over the next 20 years. A number of localities, including Great Yarmouth, Lowestoft, Hull, East Yorkshire, North and North East

[271] Marine Management Organisation (2012): Seascape character area assessment: East Inshore and East Offshore marine plan areas
[272] UK Government (2022): Anglian River Basin District River Basin Management Plan
[273] UK Government (2022): Humber River Basin District River Basin Management Plan

Lincolnshire and Grimsby, have identified offshore wind energy projects as a significant driver of growth and regeneration in their area.

- The east offshore area of the zone represents one of the largest opportunities for **carbon capture and storage** development across England.
- The east offshore area contains 39% of the **oil and gas** licence blocks in England and accounts for 27% of the area licensed for aggregate extraction in English waters
- The zone includes **Immingham** and **Grimbsy**, one of the UK's busiest port clusters, and **Felixstowe**, which is the largest container port in the UK.
- The zone includes the major **fishing** ports of Hull, Grimsby and Bridlington, as well as smaller ports such as Kings Lynn and Wells.
- There is an abundance and variety of **archaeological remains** in the offshore area of the zone. In locations such as the Dogger Bank, the potential exists to discover evidence of prehistoric activity in areas that were once on land during the last ice age. In this respect the area referred to as 'Doggerland' is particularly rich in Mesolithic remains.
- The receding of the **coastline** in locations such as Spurn Head and north Norfolk are also revealing significant archaeological finds.
- The zone is rich in **habitats and species**. Breeding populations of many of the seabirds that are known to breed in the UK can be found in this zone. Wide ranging mobile species include many sea and waterbirds, e.g. foraging species such as kittiwakes and red-throated diver, cetaceans such as harbour porpoise, white-beaked dolphin, Atlantic white-sided dolphin, and minke whale. In addition, the largest colony of common seals in Europe occurs around the Wash, and at Donna Nook, there is one of the largest breeding colonies of grey seals in the UK.
- **The Humber** and **The Wash** are two of the most biodiverse locations in GB.
- There are **six MCZs** located in the zone.
- 40% of the east inshore area is licensed for **aggregate extraction** in English waters.
- **Ten MCAs** have been identified in the east inshore and offshore marine plan areas.
- Significant **coastal change** (including coastal erosion) is taking place at locations such as Spurn Head, the coastline of north east Norfolk and the Suffolk coast.
- Particular challenges facing the **water environment** relevant to coastal areas include climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; and plastic pollution.

23. Zone M6: South and South East England

Overview of Zone M6

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for M6

23.1. Overview of Zone M6

Figure 23.1: Area covered by Zone M6 – South and South East England

Zone M6 covers the marine area adjoining the south east and southern England (see Figure 23.1 above). It includes the south east inshore and south inshore and offshore marine plan areas, covering much of the English Channel.

The south east inshore marine plan area part of the zone incorporates approximately **1,400 km** of coastline stretching from Felixstowe in Suffolk to near Folkestone in Kent, taking in approximately **3,900 km²** of sea. The south inshore marine plan area part of the zone covers an area of approximately **1,000 km** of coastline stretching from Folkstone in Kent to the River Dart in Devon, taking in approximately **10,000 km²** of sea.

The east inshore and offshore marine plan area borders this zone to the east, whilst the south west inshore and offshore marine plan area borders this zone to the west. The south east inshore marine area of the zone overlaps with 42 local authorities, whilst the south inshore marine area part of the zone overlaps with 12 local authorities. The inshore marine areas also border two National Parks and eight National Landscapes.

The south offshore marine plan area part of the zone includes the area from 12 nautical miles extending out to the seaward limit of the EEZ, a total of approximately **10,000 km²** of sea. The marine areas of France and the Channel Islands border the south offshore marine plan area.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

23.2. Air quality

There are **several AQMAs** adjacent to the south east and south inshore areas of the zone, most declared for NO_2 levels. Most notable are the AQMAs covering **Greater London**.

Port activities and ship-source pollutants can be an issue in some port locations, including relating to NOx, sulphur SOx and PM_{10}, which is the case for **Southampton** and **Portsmouth**. In **Dover**, the main sources of pollutant emissions are linked with port activities – including cross-channel shipping movements.

23.3. Climate change

Impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projects, in the South East England region winters in the 2070s (2061-2080) could be up to 3.12°C warmer and 22.4% wetter, with summers up to 5.3°C hotter. In terms of the warming of the sea, data indicates there has been a sea surface temperature increase of approximately 0.3°C per decade for the last 40 years around the UK[274].

Mean sea level rise around the UK has been between 12-16cm since 1900[275] and sea level projections to 2300 suggest that UK sea levels will continue to rise over the coming centuries under all RCP climate change scenarios. As highlighted by the Met Office, the UK is locked into accelerated sea level rise over this timeframe regardless of trends in greenhouse gas emissions[276].

UK tide gauge records show substantial year to year changes in coastal water levels[277]. Marine data recorded by the **Newhaven tidal gauge** indicates that the sea level is expected to rise in this zone by **0.55m by 2100**[278], relative to the 1981-2000 average[279]. This is based on the RCP4.5 emissions scenario[280]; it is noted that projections of sea level change around the UK can vary substantially by climate change scenario.

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[274] National Oceanography Centre (2023): New report predicts UK oceans to warm by more than three degrees by 2100

[275] Horsburgh, K. et al. (2020): Impacts of climate change on sea-level rise relevant to the coastal and marine environment around the UK

[276] Met Office (2019): UK sea level projections to 2300

[277] Met Office (2018): UKCP18 Marine report

[278] This is the 50th percentile figure and has been selected as it is a stable measurement to evaluate long-term trends.

[279] Met Office (no date): UKCP data

[280] RCP4.5 assumes that global emissions peak around 2040 and then decline, leading to a moderate level of climate change. To achieve this emissions scenario, global climate policies focused on reducing greenhouse gas emissions through technological innovation and sustainable practices will be required. RCP4.5 is often used in climate modelling to assess future climate impacts and to guide policy decisions.

In addition to sea level rise, climate change has resulted in further impacts to ocean systems that have caused irreversible losses in coastal and open ocean marine ecosystems[281]. The ocean acts as a carbon sink; a natural reservoir that absorbs the atmosphere's carbon through physical and biological means. It is estimated that the ocean absorbs approximately 30% of carbon dioxide that is released into the atmosphere; when it is absorbed by seawater, a series of chemical reactions occur which result in ocean acidification[282]. Human-induced climate change has caused further ocean acidification – open ocean surface pH has declined between 0.017–0.027 pH units per decade since the last 1980s[283]. This impacts upon the ecosystems within the ocean, and can have a further impact upon food production due to changes in the distribution and abundance of fish populations. Additionally, climate change has an impact on extreme wave height (linked to coastal erosion and flooding), and marine heat-related events; it is reported that marine heatwaves have doubled in frequency, have become longer lasting, and are more intense. This results in widespread coral bleaching and reef degradation[284] - which can further impact upon the loss of marine biodiversity.

In terms of **climate change mitigation**, both the south east inshore marine plan area and the south inshore and offshore marine plan areas have been identified as having significant potential for offshore wind energy generation.

23.4. Community wellbeing

The south east inshore marine plan area includes **shipping activity** of international significance and important shipping lanes to Europe that lie in close proximity to offshore wind installations. The south east inshore marine plan area is home to the highest number of **ports and harbours** in England, contributing the greatest amount of gross value added to the national economy of all the English marine plan areas from ports and shipping. These include the Port of London, with high volumes of traffic, Felixstowe, the UK's largest container port, Dover, the UK's busiest ferry port and top port for roll-on/roll-off freight and the major port of Southampton.[285] The zone includes the cross-channel ferry ports of Harwich, Dover, Folkestone, Newhaven, Portsmouth, Poole and Weymouth. Associated activities such as dredging of ports, harbours and approaches are essential to ensure safety of navigation, ensuring the viability of ports and harbours, along with the ability to compete in the global maritime sector.

Whilst no **oil and gas production** currently takes place within the zone, there are existing licensed blocks within the south inshore marine plan area.

Fishing activity in the zone primarily target shellfish species including scallops, cockles and whelks, with some areas in the zone also harvesting sizable quantities of demersal species from Brixham. Notably, Brixham had the highest value of landings in GB in 2022,

[281] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[282] NOAA (2020): Ocean acidification
[283] IPCC (2019): Special Report on the Ocean and Cryosphere in a Changing Climate
[284] United Nations (no date): How is climate change impacting the world's ocean
[285] UK Government (2014): Marine planning: Strategic Scoping Report

and Shoreham-by-Sea and Brixham have the largest shellfish landings of any port in England.

The key fishing ports in the zone and the tonnage and value of **fish landed in 2023** is set out in Table 23.1 overleaf.

Table 23.1: Tonnage and value of all fish landed in 2023 at important ports for fisheries landings in Zone M6 (source: UK Sea Fisheries Statistics 2023)

Port	Quantity ('000 tonnes)	Main species landed	Value (£ million)
Brixham	13.8	Cuttlefish	45.4
Shoreham-by-Sea	8.5	Scallops	15.0
Leigh-On-Sea	3.9	Cockles	3.9
Whitstable	2.3	Cockles	2.1
Weymouth	1.9	Mussels	4
Eastbourne	2.4	Whelks	4
Portsmouth	1.8	Whelks	3.4

Aquaculture is a locally important activity in both the south east inshore marine plan area and south marine plan areas, particularly for shellfish species. The main shellfish species cultured in the south marine plan areas – mussels and oysters – are filter feeders and can help improve water quality.

Tourism and recreation both play an important role in the economy of the south east. London and the River Thames are significant areas for tourism, with the coastlines of Suffolk, Essex, Kent, East Sussex, West Sussex, Hampshire, Dorset and Devon being key draws. Numerous coastal resorts are present along the coast where tourism is a key activity, including, for example Southend-on-Sea, Whitstable, Margate, Ramsgate, Deal, Folkestone, Hastings, Eastbourne, Brighton, Bognor Regis, the Isle of Wight, Bournemouth/Poole, Swanage, Weymouth, Sidmouth, Exmouth, Teignmouth and Torbay. **Boating activity** is an important recreational activity throughout the marine plan area, with over 140 recognised recreational Royal Yachting Association cruising routes. There are a high number of **marinas and mooring facilities** in the majority of the estuaries in the south east inshore marine plan area.

23.5. Cultural heritage and historic environment

There are large numbers of **heritage assets** in the immediate vicinity of Zone M6. They include both designated and non-designated heritage assets and include a range of scheduled monuments, listed buildings, registered parks and gardens and registered battlefields. The settings of many of these assets (and their significance) are heavily influenced by the marine environment.

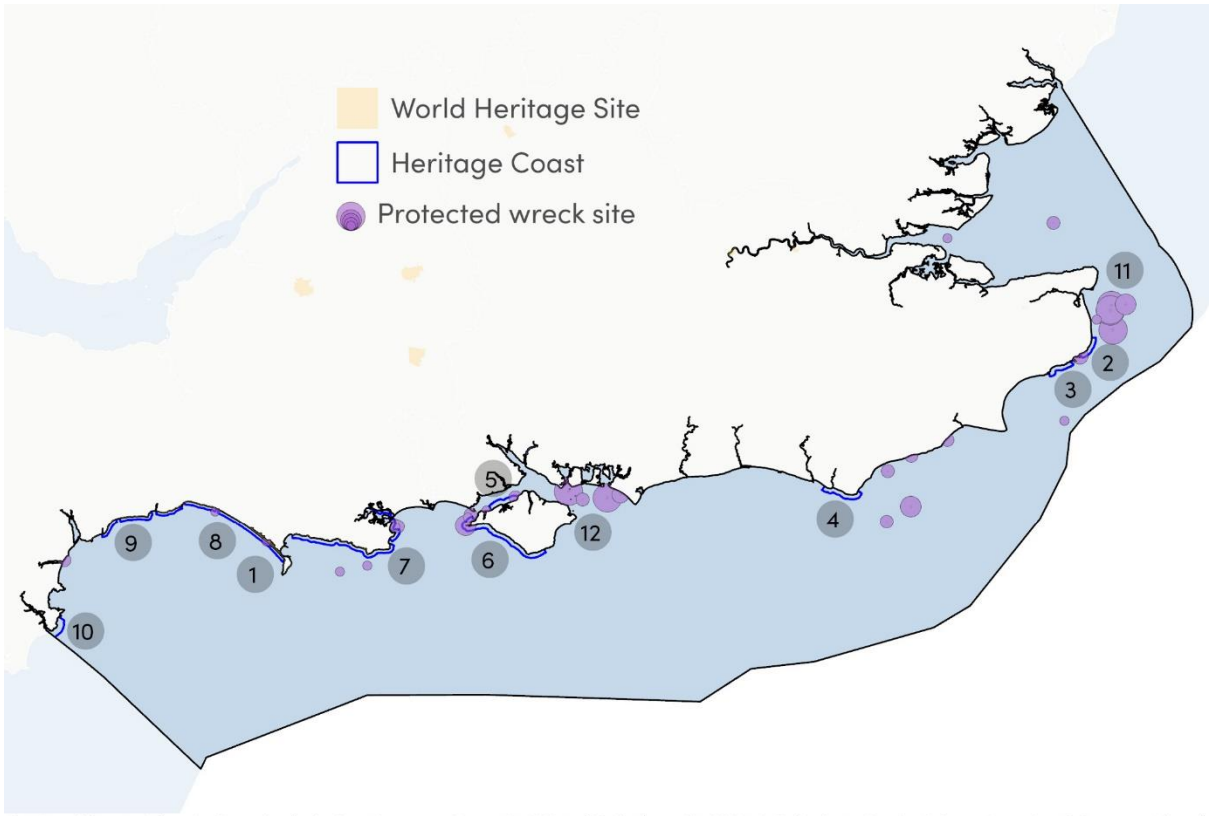

Figure 23.2: Designated heritage assets within Zone M6

Zone M6 is adjacent to the **Dorset and East Devon Coast WHS** (**1**), which provides an almost continuous sequence of rock formations spanning the Mesozoic Era, or some 185 million years of the earth's history.[286] The area's important fossil sites and classic coastal geomorphologic features have contributed to the study of earth sciences for over 300 years.

Heritage coasts have been established to conserve the best stretches of undeveloped coast in England and Wales. A proportion of the coastline of the zone is designated as heritage coast (see Figure 23.2 above). The heritage coasts are South Foreland (**2**), Dover-Folkestone (**3**), Sussex (**4**), Hamstead (**5**), Tennyson (**6**), Purbeck (**7**), West Dorset (**8**), East Devon (**9**), and South Devon (**10**).

Given the location of the zone in relation to the English Channel, there are a significant number of sites of **shipwrecks**. Particular clusters of protected wreck sites include off the coast of Goodwin Sands in Kent (**11**) and Portsmouth (**12**) (see Figure 23.2 above).

Coastal erosion is putting heritage assets and levels of access at risk, which may accelerate in the long-term due to climate change and sea level rise.

[286] UNESCO (no date): Dorset and East Devon Coast

23.6. Ecology and biodiversity

Zone M6 contains a diverse range of habitats and species. There are a significant number of statutory designations for protecting the marine environment within and bordering the zone, which are discussed overleaf.

Within the south east inshore marine plan area, the River Thames and the estuaries in Essex, Kent and Suffolk support significant assemblages of **waterfowl** and **breeding birds**, such as the avocet and the dark-bellied brent goose. Sediments in the inner and outer Thames estuary are home to many **invertebrates**. The **European eel** is also an important migratory species in the Thames. In addition, the Thanet coast contains the longest continuous **subtidal chalk seabed** in the UK and is the only site to protect the **stalked jellyfish**. Large and highly dynamic sandbanks occur throughout the greater Thames Estuary and off Thanet, which support species such as **ross worms**, **harbour seals**, and commercially important **shellfish and flatfish**.

Notably, the zone has high-risk pathways for the introduction and spread of **invasive non-native species** due to the proximity to continental Europe, recreational boating, marine litter, coastal infrastructure, and containing some of the UK's busiest ports. Such species have potential to adversely affect internationally designated habitats and species, as well as commercially valuable fisheries and shellfisheries.

Habitats in the zone include mudflats, coastal and floodplain grazing marsh, coastal saltmarsh, maritime cliff and slope, lowland fens, good quality semi-improved grassland, reedbeds, coastal vegetated shingle, saline lagoons, coastal sand dunes, lowland calcareous grassland, lowland dry acid grassland, lowland meadows, lowland heathland, deciduous woodland, wood-pasture and parkland, and purple moor grass and rush pastures. It is noted that this zone experiences a lack of space for coastal habitats due to a reduction in space between coastal structures and the rising sea level (coastal erosion also plays a part).

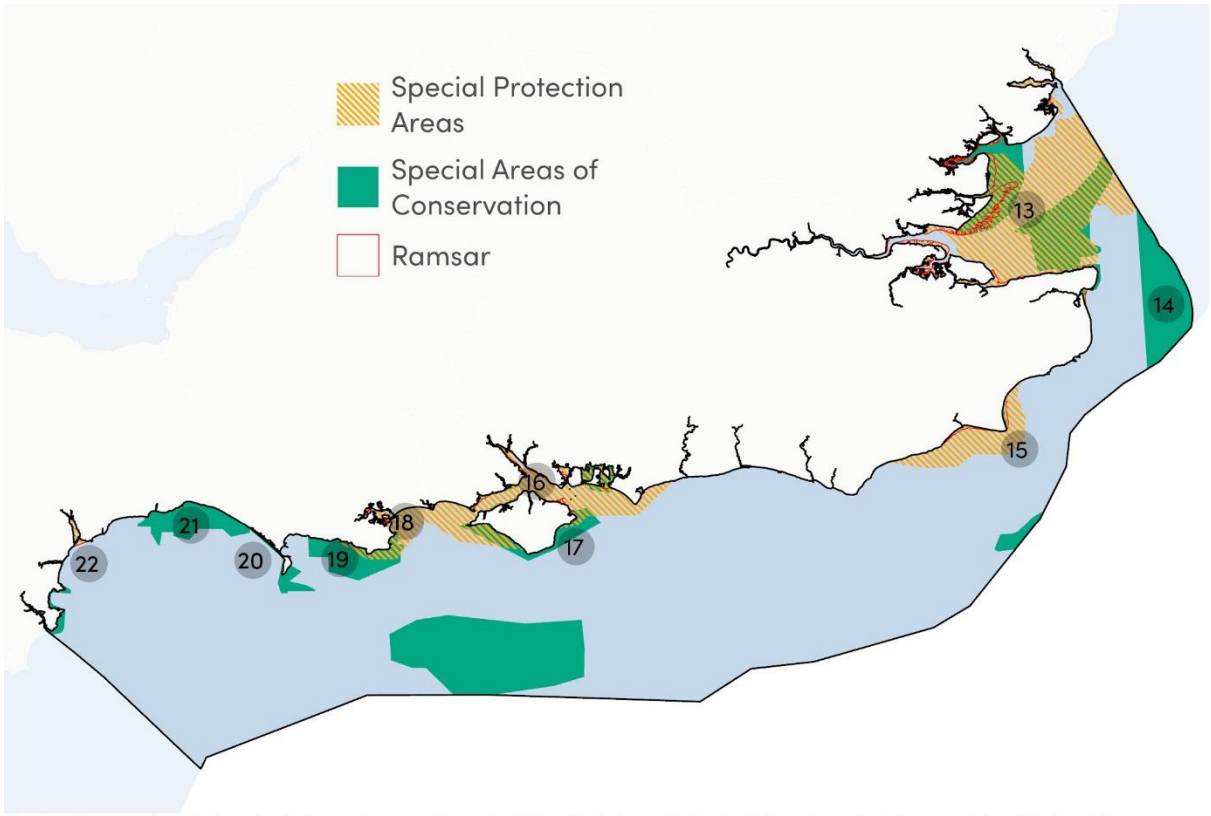

Figure 23.3: Internationally designated sites for biodiversity in Zone M6

A significant proportion of Zone M6 is designated for its biodiversity value. Internationally designated sites for biodiversity – **SACs**, **SPAs** and **Ramsar sites** – in Zone M6, as shown in Figure 23.3 above, include:

- Essex Estuaries (**13**)
- Thames Estuary & Marshes, the Swale, the Southern North Sea (**14**)
- Dungeness (**15**)
- Solent Maritime (**16**)
- South Wight Maritime (**17**)
- Poole Harbour (**18**)
- Isle of Portland to Studland Cliffs (**19**)
- Chesil Beach & the Fleet (**20**)
- Sidmouth to West Bay (**21**)
- The Exe Estuary (**22**)

Nationally designated sites for biodiversity, including **SSSIs** and **NNRs**, are also located throughout Zone M6 (see Figure 23.4 below). These include (but are not limited to):

- Dengie, Foulness (**23**)
- South Thames Estuary and Marshes
- The Swale
- Thanet Coast
- Dungeness
- Romney Marsh and Rye Bay

- Chichester Harbour (**24**)
- Langstone Harbour (**24**)
- Portsmouth Harbour (**24**)
- Poole Harbour (**25**)
- Isle of Portland
- Chesil & The Fleet
- The Exe Estuary (**26**)
- Dawlish Warren

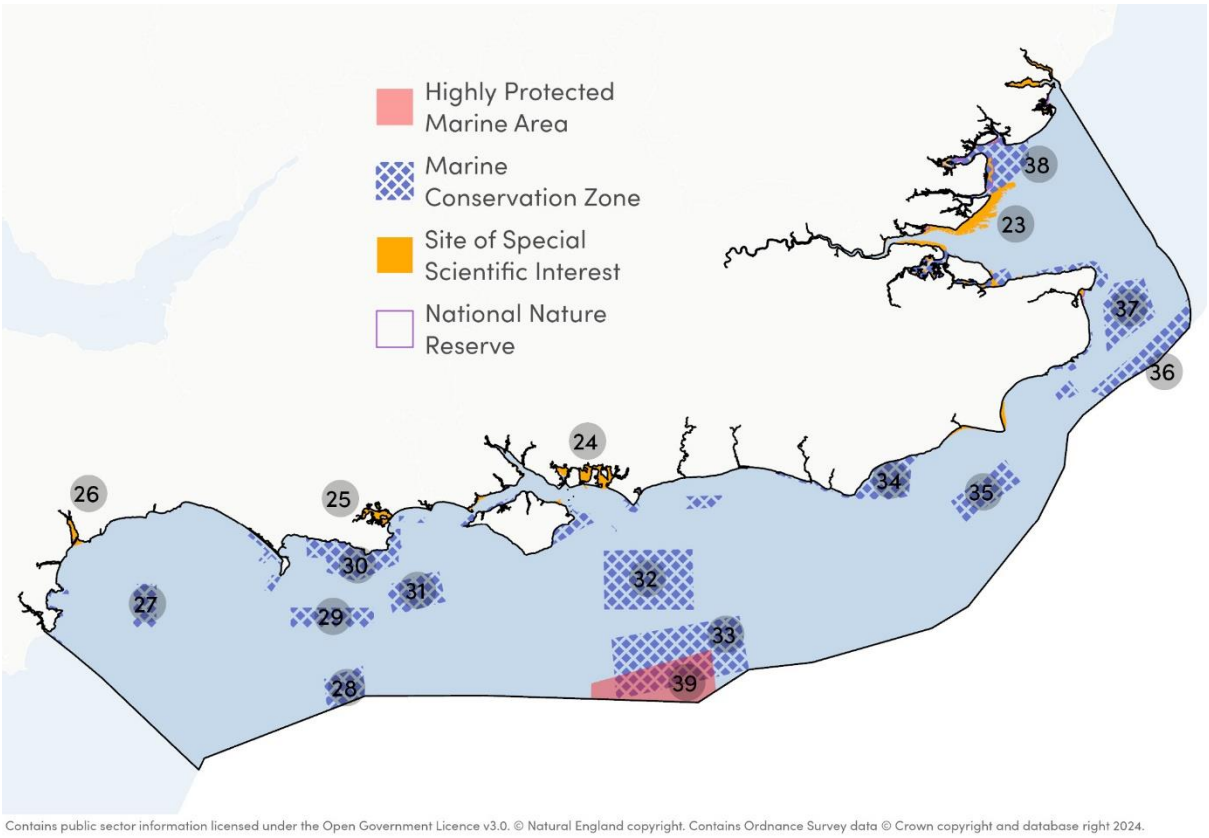

Figure 23.4: Nationally designated sites for biodiversity in Zone M6

Zone M6 contains **37 MCZs** (as shown in Figure 23.4 above), which are:

- Dart Estuary
- Torbay
- East of Start Point (**27**)
- Otter Estuary
- Axe Estuary
- Chesil Beach and Stennis Ledges
- South of Portland
- West of Wight-Barfleur (**28**)
- South Dorset (**29**)
- Purbeck Coast (**30**)
- Albert Field (**31**)
- Studland Bay

- Poole Rocks
- Southbourne Rough
- The Needles
- Yarmouth to Cowes
- Bembridge
- Utopia
- Offshore Overfalls (**32**)
- Offshore Brighton (**33**)
- Selsey Bill and the Hounds
- Pagham Harbour
- Kingmere
- Beachy Head West
- Beachy Head East (**34**)
- Inner Bank (**35**)
- Folkestone Pomerania
- Dover to Folkestone
- Dover to Deal
- Foreland (**36**)
- Goodwin Sands (**37**)
- Thanet Coast
- The Swale Estuary
- Medway Estuary (multiple zones)
- Swanscombe
- Blackwater, Crouch, Roach and Colne Estuaries (**38**)
- Kentish Knock East

HPMAs are areas of the sea (including the shoreline) that allow the protection and full recovery of marine ecosystems. By setting aside some areas of sea with high levels of protection, HPMAs will allow nature to fully recover to a more natural state, allowing the ecosystem to thrive. There is **one HPMA** in Zone M6 (see Figure 23.4 above), which is:

- The **Dolphin Head HPMA** (**39**) is a diverse area within the Eastern Channel which has several habitat types that more broadly support a wide range of benthic and demersal species.[287] In addition to these, several species, including seabirds such as the Common guillemot, Lesser black-backed gull and Northern gannet and two marine mammals, the Grey seal and Harbour porpoise, are also likely to use this area. The seabed in this area contains animal dominated rocky reef as well as coarse and mixed sediment habitats. Areas of ross worm reef occur on the mixed sediments. These small tube building worms build reefs which help to stabilise cobble, pebble and gravel habitats. This structural complexity enhances the biodiversity and abundance of benthic species present in this area. Ross worm reef habitats in this area are significant for nature conservation, however this type of habitat is particularly affected by dredging or trawling and in heavily dredged or disturbed areas an impoverished community may be left.

[287] UK Government (2023): Highly Protected Marine Areas: Dolphin Head

23.7. Land and soil resources

Given the zone is a marine zone, there are no specific elements to highlight for this theme relating to Zone M6. However, marine **aggregate extraction** is important locally, with half of all aggregates used in construction in London being from marine sources.

23.8. Landscape and seascape

The zone has a diverse range of **seascape types** which reflect the interplay of the zone's topography, geology, biodiversity, land uses and cultural heritage.

The seascape and landscape of the south east and south marine plan areas comprises a complex mosaic of overlapping natural, cultural and built heritage components. In many cases, these components benefit from their own statutory protections.

The Seascape Character Assessment for the south east inshore marine plan area[288] identifies **seven MCAs in the south east inshore marine plan area**: Goodwin Sands and North Dover Strait, Eastern English Channel Approaches, Swale, Kentish Flats and Margate Sand, Thanet Shipping Waters, Thames and Medway Estuaries, and Essex and South Suffolk Estuaries and Coastal Waters.

The Seascape Assessment for the south marine plan areas[289] identifies **14 MCAs in the south marine plan areas**: Lyme Bay (West), Lyme Bay (East), Portland, Weymouth Bay and Lulworth Banks, Poole and Christchurch Bays, The Solent, South Wight, Selsey Bill to Seaford Head, South Downs Maritime, Eastbourne, Pevensey & Rye Bays, Dungeness, Hythe and East Wear Bays, Dover Strait Inshore Waters, Dover Strait Inshore Waters (outside study area), English Channel / Dover Strait, English Channel (East) / Dover Strait (outside study area), English Channel (Central), and English Channel (West) & the Wight-Barfleur Reef.

There are eight **National Landscapes** adjacent to or within proximity to this zone, which are: Suffolk Coast and Heaths, the Kent Downs, High Weald, Chichester Harbour, the Isle of Wight, Dorset, East Devon, and South Devon. There are also two **National Parks** adjacent to this zone: the New Forest and the South Downs.

23.9. Water

The zone has 47 beaches with **blue flag status**, with notable clusters around Southend-on-Sea, Margate, Broadstairs, Christchurch, Bournemouth, and Torbay. There are approximately 177 **classified bathing beaches** in the zone, with approximately 95% achieving either sufficient, good or excellent status. Locations where the latest (2024) classification is 'poor' water quality or otherwise 'bathing is not advised' include Clacton (Groyne 41), Deal Castle, Dymchurch, Littlestone, Worthing Beach House, Bognor Regis (Aldwick), Southsea East, Lyme Regis Church Cliff Beach, and Steamer Quay, Dart Estuary.

There are a number of challenges to maintaining good water quality in the south east inshore marine plan area, notably **diffuse pollution** and **management of wastewater**

[288] Marine Management Organisation (2018): Seascape Character Assessment for the South East Inshore marine plan area

[289] Marine Management Organisation (2014): Seascape assessment for the South Marine Plan Areas: technical report

from the large catchment areas surrounding the Thames. These challenges can be exacerbated by periods of heavy rainfall, which can put pressure on the sewage systems, resulting in combined sewer overflows operating more frequently. Heavy rainfall is also more likely to flush pollutants form agricultural and urban land into rivers and the sea.

There is a higher-than-average concentration of food and drink packaging, wet wipes and sewage-related debris found along the shores of the Tidal Thames and south east coastline. Riverine litter input is estimated to be a major contributor to **marine litter**. The south east inshore marine plan area also received a large amount of fishing-related debris.

In the last ten years there have been significant **coastal flood events** in this period which have impacted on key transport infrastructure in the region, including Storm Ciaran (November 2023), where large waves battered the South Coast with several vehicles swept into the sea and a major incident declared in Hampshire and the Isle of Wight. In addition, a storm in Dawlish in February 2014 lead to the evacuation of homes and the destruction of part of the south west railway line.

As highlighted in the Thames[290], South East[291] and South West[292] River Basin District River Basin Management Plans, particular **challenges facing the water environment** relevant to coastal areas include: climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; and plastic pollution.

23.10.Key issues for Zone M6

The following key issues have been identified through the review of the baseline information for Zone M6:

- Port activities and ship-source **pollutants** can be an issue in some port locations, including relating to NOx, SOx and particulate matter – including in Southampton and Portsmouth. In Dover, the main sources of pollutant emissions are linked with port activities – including cross-channel shipping movements.
- Marine data recorded by the Newhaven tidal gauge indicates that the **sea level** is expected to rise in this zone by 0.55m by 2100.
- The south east inshore marine plan area and the south inshore and offshore marine plan areas have been identified as having significant potential for **offshore wind** energy generation.
- The zone includes major ports such as the **Port of London**, the **Port of Dover** and the **Port of Southampton**.
- The zone includes the cross-channel **ferry ports** of Harwich, Dover, Folkestone, Newhaven, Portsmouth, Poole and Weymouth.

[290] UK Government (2022): Thames River Basin District River Basin Management Plan
[291] UK Government (2022): South East River Basin District River Basin Management Plan
[292] UK Government (2022): South West River Basin District River Basin Management Plan

- The south east inshore marine plan area includes **shipping activity** of international significance and important shipping lanes to Europe that lie in close proximity to offshore wind installations.
- Brixham and Shoreham-on-Sea are key **fishing ports** in the zone. Brixham had the highest value of landings in GB in 2022, and Shoreham-by-Sea and Brixham have the largest shellfish landings of any ports in England.
- Given the location of the zone in relation to the English Channel, there are a significant number of sites of **shipwrecks**. Particular clusters of protected wreck sites include off the coast of Goodwin Sands in Kent, Portsmouth and Southampton.
- A significant proportion of the south east and south of England's coastline is internationally designated for its **biodiversity** value.
- The River Thames, the estuaries in Essex, Kent and Suffolk and the Solent, Poole Harbour and the Exe Estuary support significant assemblages of **waterfowl** and **breeding birds**.
- There are **37 MCZs** in the zone.
- **Dredging and trawling** is a significant issue for seabed habitats in the zone.
- Marine **aggregate extraction** is important locally, with half of all aggregates used in construction in London being from marine sources.
- There are two **National Parks** and eight **National Landscapes** adjacent to or within proximity to this zone.
- There are a number of challenges to maintaining good **water quality** in the south east inshore marine plan area, notably diffuse pollution and management of wastewater from the large catchment areas surrounding the Thames.
- **Marine litter** is a significant issue in this zone.
- Particular challenges facing the **water environment** relevant to coastal areas include climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; and plastic pollution.

24. Zone M7: South West England

Overview of Zone M7

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for M7

24.1. Overview of Zone M7

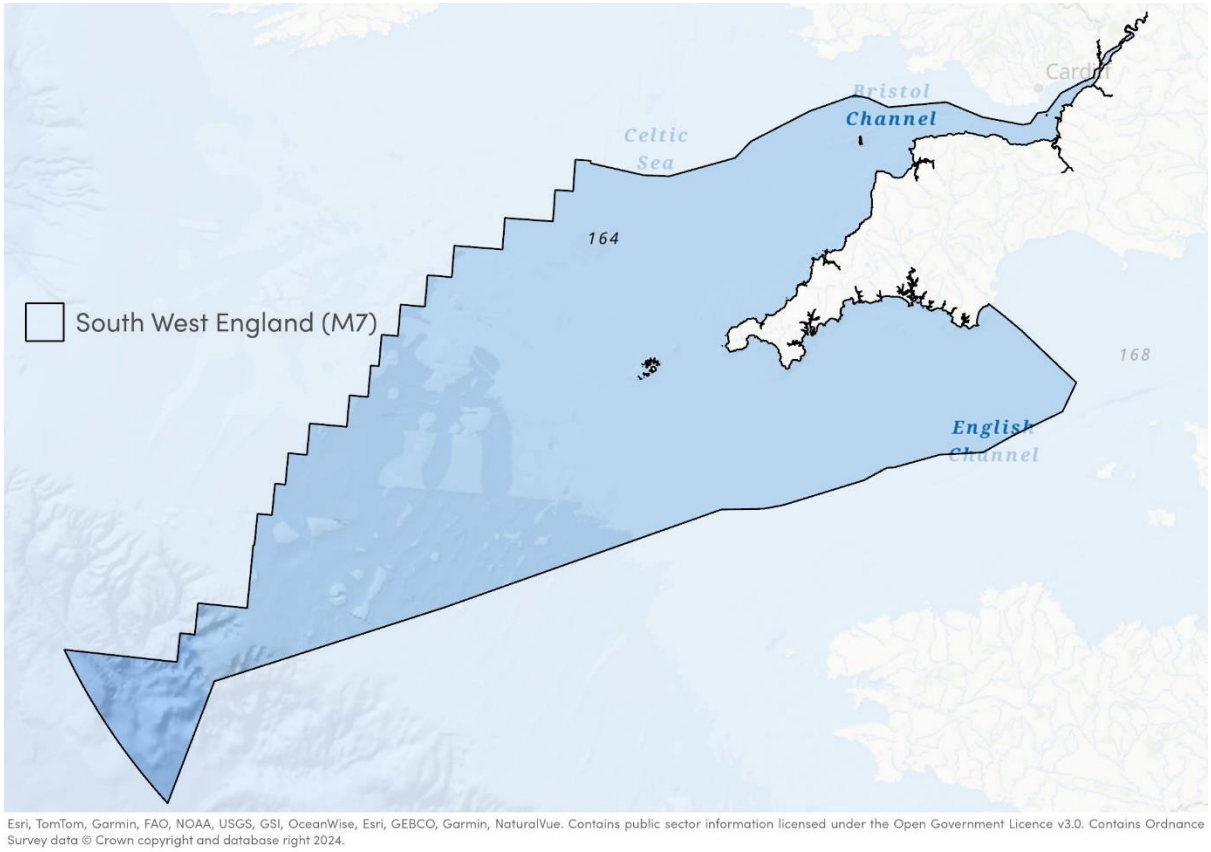

Figure 24.1: Area covered by Zone M7

Zone M7 covers the marine area surrounding the south west peninsula of England (see Figure 24.1 above). It includes the south west inshore and offshore marine plan areas; these cover part of the English Channel to the south, the Atlantic Ocean/Celtic Sea to the west and north west and the Bristol Channel to the north.

The south west inshore marine plan area part of the zone incorporates approximately **2,000 km** of coastline stretching from the River Severn border with Wales to the River Dart in Devon, taking in a total of approximately **16,000 km²** of sea. Wales, and its marine area, and the south inshore marine plan area border the south west inshore marine plan area. The area overlaps with 16 local authorities, Exmoor National Park and five National Landscapes.

The south west offshore marine plan area part of the zone includes the area from 12 nautical miles extending out to the seaward limit of the Exclusive Economic Zone, a total of approximately **68,000 km²** of sea. The marine areas of Wales, France, Ireland, Guernsey and the south offshore marine plan area border the south west offshore marine plan area.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

24.2. Air quality

No significant air quality issues affect the zone. Port activities and ship-source pollutants can be an issue in some port locations, including relating to NOx, SOx and PM_{10}. These are though relatively insignificant; none of the main port areas of Plymouth, Falmouth or Avonmouth are designated AQMAs due to port activities.

24.3. Climate change

Impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projects, in the South West of England winters in the 2050s (2040-2059) could be up to 2.9°C warmer and 27% wetter, with summers up to 4.5°C hotter and 42% drier. However, in terms of the warming of the sea, warming within the zone has been identified to be the lowest of all the UK waters at approx. 0.3°C per decade.

Numerous areas are subject to significant coastal change in the South West, exacerbated by climate change. **Mean sea level rise** around the UK has been between 12-16cm since 1900[293] and sea level projections to 2300 suggest that UK sea levels will continue to rise over the coming centuries under all RCP climate change scenarios. As highlighted by the Met Office, the UK is locked into accelerated sea level rise over this timeframe regardless of trends in greenhouse gas emissions.[294]

Tide gauge records show substantial year to year changes in coastal water levels[295]. Sea level recorded by the **Newlyn tide gauge** in Cornwall is expected to rise by **0.59m by 2100**[296], relative to the 1981-2000 average[297]. This is based on the RCP4.5 emissions scenario[298]; it is noted that projections of sea level change around the UK can vary substantially by climate change scenario.

In addition to sea level rise, climate change has resulted in further impacts to ocean systems that have caused irreversible losses in coastal and open ocean marine ecosystems[299]. The ocean acts as a carbon sink; a natural reservoir that absorbs the atmosphere's carbon through physical and biological means. It is estimated that the ocean absorbs approximately 30% of carbon dioxide that is released into the atmosphere; when it is absorbed by seawater, a series of chemical reactions occur which result in ocean acidification[300]. Human-induced climate change has caused further ocean

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[293] Horsburgh, K., Rennie, A. and Palmer, M. (2020) Impacts of climate change on sea-level rise relevant to the coastal and marine environment around the UK. MCCIP Science Review 2020, 116–131.
[294] Met Office (2019) UK Sea Level Projections to 2300
[295] Met Office (2018): UKCP18 Marine report
[296] This is the 50th percentile figure and has been selected as it is a stable measurement to evaluate long-term trends.
[297] Met Office (no date): UKCP data
[298] RCP4.5 assumes that global emissions peak around 2040 and then decline, leading to a moderate level of climate change. To achieve this emissions scenario, global climate policies focused on reducing greenhouse gas emissions through technological innovation and sustainable practices will be required. RCP4.5 is often used in climate modelling to assess future climate impacts and to guide policy decisions.
[299] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability
[300] NOAA (2020): Ocean acidification

acidification – open ocean surface pH has declined between 0.017–0.027 pH units per decade since the last 1980s[301]. This impacts upon the ecosystems within the ocean, and can have a further impact upon food production due to changes in the distribution and abundance of fish populations. Additionally, climate change has an impact on extreme wave height (linked to coastal erosion and flooding), and marine heat-related events; it is reported that marine heatwaves have doubled in frequency, have become longer lasting, and are more intense. This results in widespread coral bleaching and reef degradation[302] - which can further impact upon the loss of marine biodiversity.

In terms of **climate change mitigation**, Zone M7 has been identified as having significant potential for wave, wind, tidal stream and tidal range energy resources.

24.4. Community wellbeing

The communities that exist within the south west of England have a strong maritime heritage and are intrinsically linked to the marine area in Zone M7. Communities are predominantly rural with several urban areas present, including alongside the Severn Estuary, Bideford/Barnstaple, Bude, Newquay, Penzance, Falmouth and Plymouth.

The zone hosts a range of activities of economic importance. Key **fishing ports** in the area include Newlyn in Cornwall and Plymouth in Devon. In 2022, Newlyn handled approximately 16,183 tonnes of landings, the highest quantity of landings for any port in England.[303] With Brixham (located a few kilometres outside of the zone), the area is home to the largest number of fishing vessels in England, with associated ports such as Padstow, Fowey, Salcombe and Dartmouth also being important centres for supporting the industry. **Aquaculture** is also a growing marine activity in the zone.

The key fishing ports in the zone and the tonnage and value of **fish landed in 2023** is set out in Table 24.1 overleaf.

Table 24.1: Tonnage and value of all fish landed in 2023 at important ports for fisheries landings in Zone M7 (source: UK Sea Fisheries Statistics 2023)

Port	Quantity ('000 tonnes)	Main species landed	Value (£ million)
Newlyn	15.8	Sardines	37.7
Plymouth	5.3	Scallops	13.8
Ilfracombe	1.1	Whelks	2.0
Mevagissey	1.1	Sardines	2.1
Salcombe	0.9	Crabs	3.6

The many **ports and harbours** in the zone play an important role in national, regional and local economies including, but not limited to, the Port of Bristol (Avonmouth), Plymouth

[301] IPCC (2019): Special Report on the Ocean and Cryosphere in a Changing Climate
[302] United Nations (no date): How is climate change impacting the world's ocean
[303] MMO (2023): UK Sea Fisheries Statistics 2022

and numerous facilities within the Fal Estuary. Ports across the zone are important for cargo, ferry and roll-on/roll-off services, providing links to continental Europe and the Isles of Scilly. As well as direct employment, ports bring together groups of related businesses within and around the estate, creating a cluster effect and supporting economic growth for maritime industries. In addition to economic activity, the small and large ports of the south west are an important part of the cultural heritage of the area.

There are innovative approaches to **renewable energy** projects being developed and implemented across Zone M7, making use of the significant tidal and wind resources. There is also a significant amount of **underwater cabling**, including large international fibre optic telecom cables crossing the North Atlantic. There are marine **aggregate** exploration and option areas in the Bristol Channel.

The zone has a rich **military heritage**. An example of this is in Devonport, which has the largest naval base in western Europe and has been supporting the Royal Navy since 1691. Military activities in the zone are diverse and range from operational vessels, naval bases, surface and sub-surface navigational interests, access to underwater acoustic ranges, as well as training areas. For example, there are over 13,000km^2 of military practice and exercise areas used for military training.

The sea and coastline of the zone is a key draw for the south west of England's **tourism** industry. The sea offers a range of tourism and recreational opportunities; for example there are a large number of recreational marinas in the zone, it is an important destination for wildlife watching, and surfing is of significance in Cornwall and Devon.

Two existing and nominated sites for **nuclear power** are under consideration on the coast of the zone: Hinkley Point and Oldbury.

24.5. Cultural heritage and historic environment

There are large numbers of **heritage assets** in the immediate vicinity of Zone M7. They include both designated and non-designated heritage assets and include a range of scheduled monuments, listed buildings, registered parks and gardens and registered battlefields. The settings of many of these assets (and their significance) are heavily influenced by the marine environment.

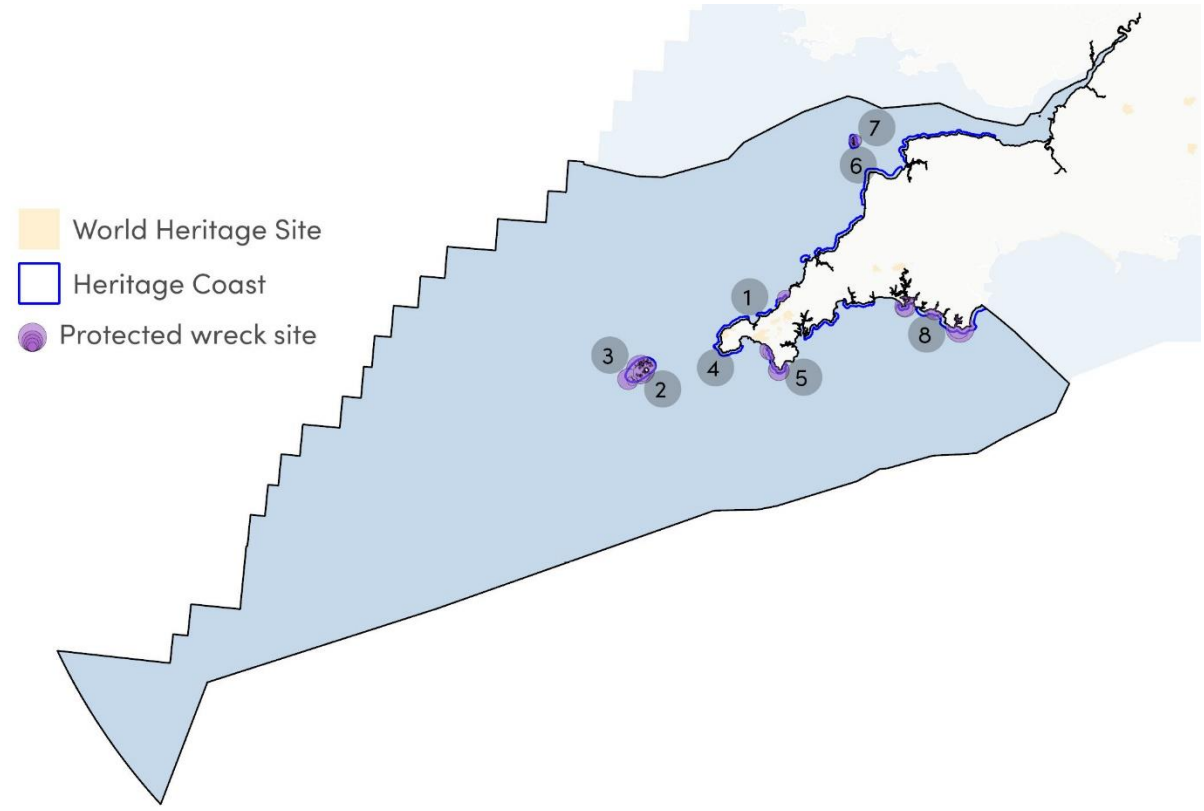

Figure 24.2: Designated heritage assets within Zone M7

The zone adjoins the **Cornwall and West Devon Mining Landscape WHS** (**1**) (see Figure 24.2 above), which was inscribed as a UNESCO WHS in 2006, encompassing ten areas with significant mining heritage. The WHS reflects the transformation of the landscape of parts of Cornwall and West Devon in the 18th and early 19th century as a result of the rapid growth of copper and tin mining activities. Five parts of the WHS adjoin or cover part of the zone: St Just Mining District; The Port of Hayle; Camborne and Redruth Mining District (with Portreath Harbour); St Agnes Mining District; and Tregonning and Gwinear Mining Districts with Trewavas.

In terms of **archaeology**, there is an abundance and variety of archaeological remains on the Isles of Scilly (**2**) (see Figure 24.2 above). The Isles of Scilly have the greatest density of Scheduled Monuments in England, which are particularly associated the Neolithic and early Bronze Age eras. These are focussed around the islands' coastal peripheries, intertidal and now submerged areas.

Heritage coasts have been established to conserve the best stretches of undeveloped coast in England and Wales. A significant proportion of the coastline of the zone is designated as heritage coast (as shown in Figure 24.2 above). The heritage coasts are South Devon, North Devon, Exmoor, Isles of Scilly, Lundy and a large proportion of Cornwall (Rame Head, Gribbin Head – Polperro, The Roseland, The Lizard, Penwith, Godrevy – Portreath, St Agnes, Trevose Head, Pentire Point – Widemouth and Hartland). In total the zone adjoins over 50% of England's heritage coast, and the Welsh heritage coast along the Bristol Channel is also visible, providing important visual and character links between the English and Welsh marine areas.

Given the location of the zone at the entrance to the English Channel, Irish Sea and Bristol Channel, and the topography and geomorphology of the coastline, there are significant numbers of sites of **shipwrecks**. Particular clusters of protected wreck sites include the Isles of Scilly (**3**), Lands End (**4**), the Lizard Peninsula (**5**), Hartland Point (**6**), Lundy Island (**7**) and south Devon (**8**) (see Figure 24.2 above).

Coastal erosion is putting heritage assets and levels of access at risk, which may accelerate in the long-term due to climate change and sea level rise.

24.6. Ecology and biodiversity

Zone M7 contains a diverse range of **habitats and species**. There are a significant number of statutory designations for protecting the marine environment within and bordering the zone. The inshore part of the zone contains the most sites of special scientific interest of all English marine plan areas. The offshore marine plan area contains England's only deepwater habitats.

The Severn Estuary contains expansive sand and mudflats, reclaimed saltmarsh, rocky intertidal areas and extensive wet grasslands.

Habitats surrounding the Bristol Channel include coastal cliffs, estuarine habitats and biogenic reefs. Sand and gravel banks are classified as important wetlands.

The coastline of western Cornwall and Devon comprises sea cliffs, deep inlets, coves and submerged reefs. The estuaries of the Helford, Fal, Tamar, Dart, Taw/Torridge and Severn comprise important wetland habitats.

Priority habitats include maerl beds, sheltered muddy gravels, intertidal boulder communities, coastal saltmarsh, seagrass beds and intertidal mudflats. Habitats in the zone support an abundance of species, including **seabirds**, **waterfowl**, **seals**, **cold-water corals** and **basking shark**.

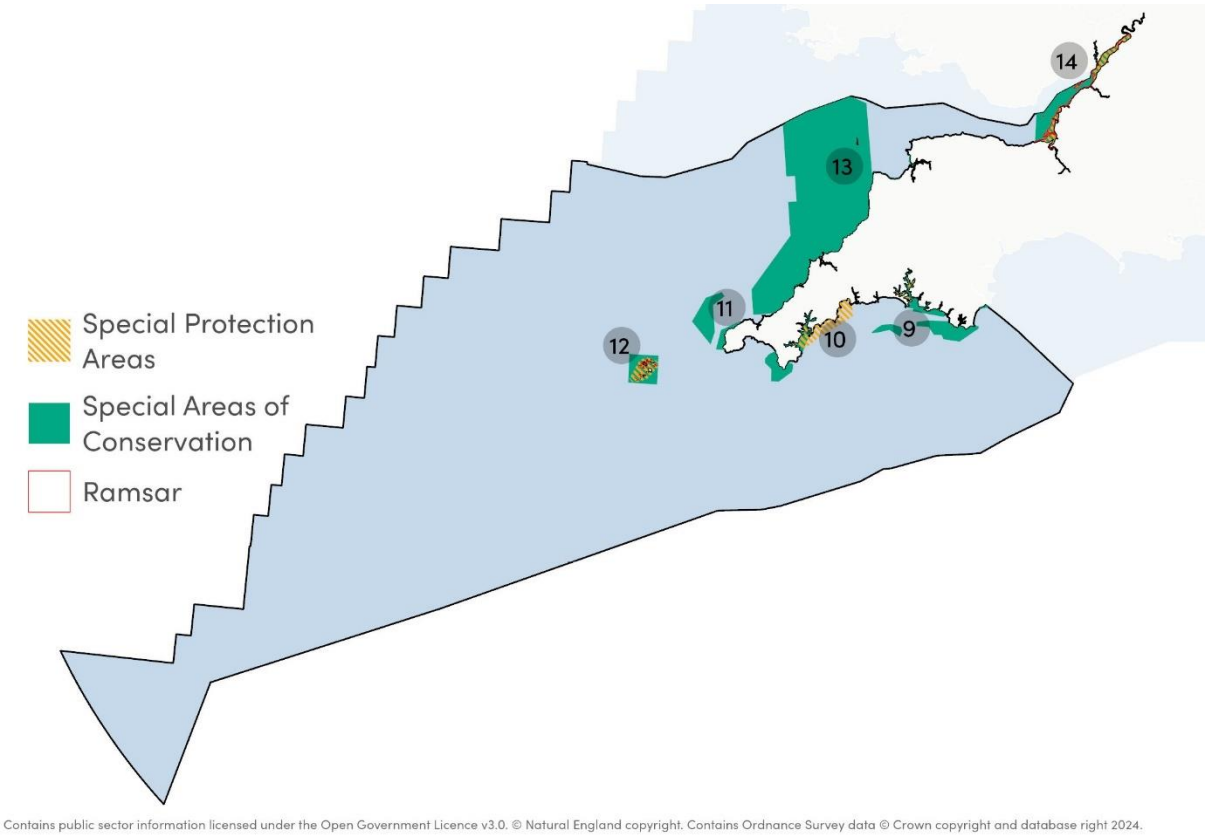

Figure 24.3: Internationally designated sites for biodiversity in Zone M7

A significant proportion of Zone M7 is designated for its biodiversity value. Internationally designated sites for biodiversity – **SACs**, **SPAs** and **Ramsar sites** – in Zone M7, as shown in Figure 24.3 above, include:

- Tamar Estuary and Plymouth Sound (**9**)
- Fal & Helford rivers (**10**)
- Tintagel-Marsland-Clovelly coast (**11**)
- Isles of Scilly (**12**)
- Bristol Channel Approaches Possible SAC (**13**)
- Severn Estuary SAC, SPA and Ramsar site (**14**)

Nationally designated sites for biodiversity, including **SSSIs** and **NNRs**, are also located throughout Zone M7 (see Figure 24.4 overleaf). These include (but are not limited to):

- Bridgewater Bay SSSI (**15**)
- Severn Estuary SSSI (**16**)

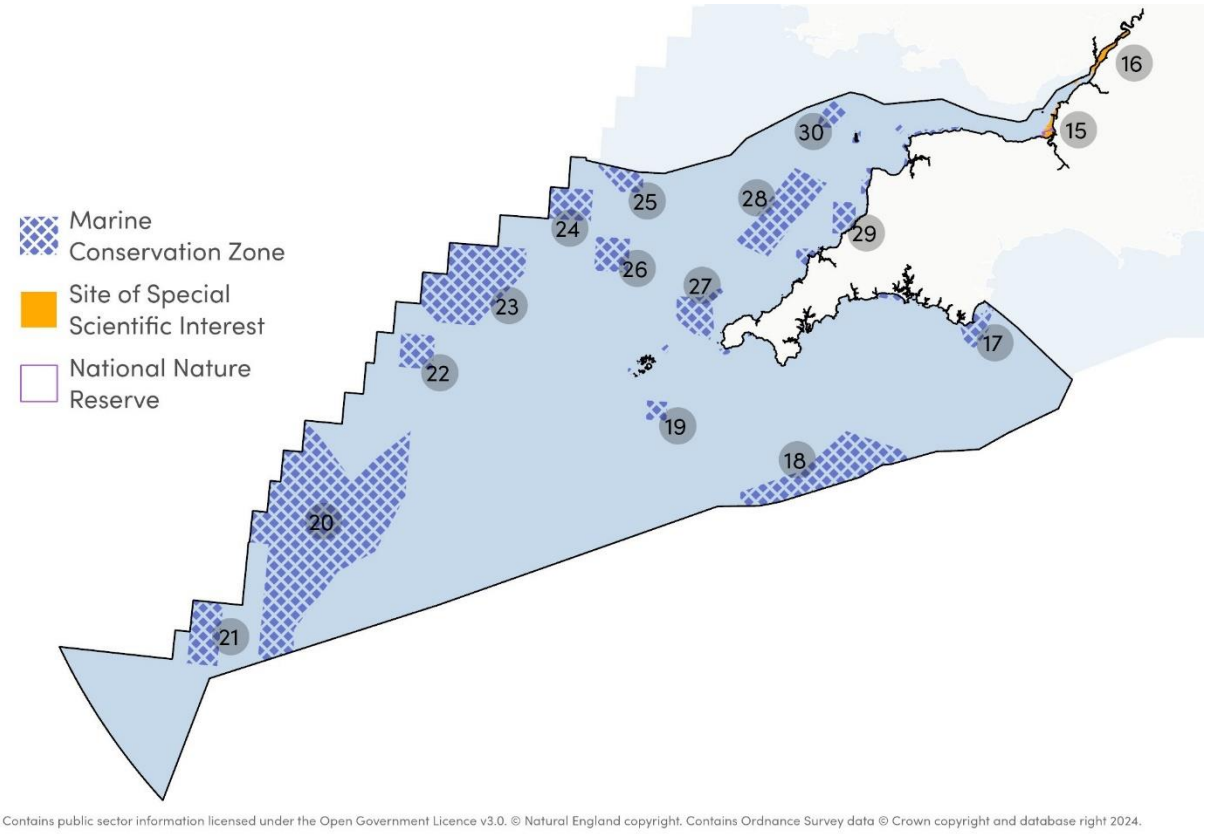

Figure 24.4: Nationally designated sites for biodiversity in Zone M7

There are **30 MCZs** located in Zone M7 (see Figure 24.4 above), which are:

- Skerries Bank and Surrounds (**17**)
- Devon Avon Estuary
- Erme Estuary
- Tamar Estuary Sites
- Whitsand and Looe Bay
- Upper Fowey and Pont Pill
- Helford Estuary
- The Manacles
- Western Channel (**18**)
- Mounts Bay
- Runnel Stone (Land's End)
- Isles of Scilly Sites (multiple)
- South of the Isles of Scilly (**19**)
- South-West Deeps (East and West) (**20**)
- The Canyons (**21**)
- North-West of Jones Bank (**22**)
- Greater Haig Fras (**23**)
- North-East of Haig Fras (**24**)
- South of Celtic Deep (**25**)
- East of Haig Fras (**26**)
- Cape Bank (**27**)

- Newquay and the Gannel
- Padstow Bay and Surrounds
- Camel Estuary
- South-West Approaches to Bristol Channel (**28**)
- Hartland Point to Tintagel (**29**)
- Lundy
- North West of Lundy (**30**)
- Morte Platform
- Bideford to Foreland Point

Deep sea habitats in the zone (e.g. biogenic reefs, boulder habitats or sponge aggregations) are vulnerable to impacts such as habitat loss or damage from mobile fishing gear (bottom trawling) and smothering of sediment or habitat damage from marine litter (mainly discarded nets). Expansion of deep-sea fisheries has the potential to increase the likelihood of such impacts.

24.7. Land and soil resources

Given the zone is a marine zone, there are no specific elements to highlight for this theme relating to Zone M7. There are though marine **aggregate exploration** and option areas in the Bristol Channel.

24.8. Landscape and seascape

The zone has a diverse range of **seascape types** which reflect the interplay of the zone's topography, geology, biodiversity, land uses and cultural heritage.

The Seascape Character Assessment for the south west marine plan areas[304] identifies **15 MCAs in the south west marine plan areas**: Severn Estuary, Bridgwater Bay, Bristol Channel, Bideford Bay and Taw-Torridge Estuary, Lundy and Outer Bristol Channel, Hartland Point to Port Isaac Bay, Port Gaverne Bay to St Ives Bay, Penwith Maritime, Isles of Scilly, Mount's Bay and The Lizard, South Cornwall Coastal Waters and Estuaries, Rame Head and Eddystone Rocks to Start Point, Bristol Channel Approaches, Western English Channel Approaches, and Celtic Shelf and Banks.

Seven **National Landscapes** lie within or adjacent to the zone including the Isles of Scilly, Cornwall, North Devon, South Devon, the Tamar Valley, Quantock Hills and the Wye Valley. Exmoor **National Park** also covers the coastline of west Somerset and part of north Devon.

24.9. Water

Most of the waters in the south west region have a **tidal range** of between 1m and 5m. The region around the Bristol Channel has a far higher tidal range, in excess of 12m in places, which is one of the largest in the world.

Annual mean significant **wave heights** are some of the greatest around England, with wave heights at the coast of 1m to 1.5m and just offshore 1.5m to 2m. Offshore wave

[304] Marine Management Organisation (2018): Seascape Character Assessment for the South West Inshore and Offshore marine plan areas

heights reach up to 2.75m. In the winter the wave power is far greater than during the summer.[305]

The **salinity** of the upper ocean has been generally increasing since a fresh period in the 1970s. The western English Channel is influenced by North Atlantic Water, tidal currents and local weather conditions. There is no discernible long-term trend in over a century of observations, but in recent years salinity has been higher than average.[306]

Water quality is a continuing issue in the zone. Bathing water quality in the zone has seen fluctuations. There are only **12 beaches** with **blue flag status** in the zone. There are approximately **130 classified bathing beaches**, with approximately 90% achieving either sufficient, good or excellent status. Locations where the latest (2024) classification is 'poor' water quality or otherwise 'bathing is not advised' include: Weston-super-Mare Sand Bay; Weston Main; Weston-super-Mare Uphill Slipway; Burnham Jetty North; Blue Anchor West; Dunster Beach; Ilfracombe Wildersmouth; Instow; Porthluney; Coastguards Beach, Erme Estuary; and Steamer Quay, Dart Estuary.[307]

An increase in the use of chemical fertilisers has resulted in increased **nutrient pollution** to coastal waters. There are five problem areas for eutrophication in the south west marine plan areas: Truro; Tresillian estuary; Fal estuary; Taw estuary; and Lower Fal Estuary. Sewerage is also an issue: there are approximately 1,700 combined sewer overflows which discharge into the zone.

With regards to **marine litter**, the south west inshore marine plan area has the highest densities of marine zones of beached litter, attributed to pressure from tourism and fishing as well as litter entering UK waters through prevailing currents. This relates in part to the zone's geographical location (the English channel being one of the busiest shipping lanes in the world, and its proximity to the Atlantic gulf stream).

In the last ten years there have been significant **coastal flood events** in this period which have impacted on key transport infrastructure in the region, including at Dawlish in 2014 which severed the main rail line south of Exeter and in south Devon at Slapton Ley in 2018, which washed away the A379.

As highlighted in the South West River Basin District River Basin Management Plan[308], particular **challenges facing the water environment** relevant to coastal areas include: climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

24.10. Key issues for Zone M7

The following key issues have been identified through the review of the baseline information for Zone M7:

[305] MMO (2022) South West Inshore and Offshore Marine Plan
[306] Ibid
[307] Environment Agency (2024): Bathing water data
[308] UK Government (2022): South West River Basin District River Basin Management Plan

- **Sea level** recorded by the Newlyn tide gauge in Cornwall is expected to rise by 0.59m by 2100, relative to the 1981-2000 average.
- Zone M7 has been identified as having significant potential for wave, wind, tidal stream and tidal range **energy resources**.
- The communities within the south west of England have a strong **maritime heritage** and are intrinsically linked to the marine areas in Zone M7.
- **Fishing** remains a key economic activity for locations in the Zone. In 2022, Newlyn handled approximately 16,183 tonnes of landings, the highest quantity of landings for any port in England. With Brixham (located a few kilometres outside of the zone), the area is home to the largest number of fishing vessels in England, with associated ports such as Padstow, Fowey, Salcombe and Dartmouth also being important centres for supporting the industry.
- The many **ports and harbours** in the zone play an important role in national, regional and local economies including, but not limited to, the Port of Bristol (Avonmouth), Plymouth and numerous facilities within the Fal Estuary. Ports across the zone are important for cargo, ferry and roll-on/roll-off services, providing links to continental Europe and the Isles of Scilly.
- The sea and coastline of the zone is a key draw for the south west of England's **tourism** industry.
- Two existing and nominated sites for **nuclear power** are under consideration on the coast of the zone: Hinkley Point and Oldbury.
- The zone has a rich maritime **historic environment** and cultural heritage.
- The Isles of Scilly have the highest density of **scheduled monuments** in England, which are particularly associated the Neolithic and early Bronze Age eras. These are focussed around the islands' coastal peripheries, intertidal and now submerged areas.
- In total the zone adjoins over 50% of England's **heritage coast**, and the Welsh heritage coast along the Bristol Channel is also visible, providing important visual and character links between the English and Welsh marine areas.
- The **Cornwall and West Devon Mining Landscape** has a strong maritime connection, including coastal and undersea mining and port areas.
- Given the location of the zone at the entrance to the English Channel, Irish Sea and Bristol Channel, and the topography and geomorphology of the coastline, there are significant numbers of sites of **shipwrecks**. Particular clusters of protected wreck sites include the Isles of Scilly, Lands End, the Lizard Peninsula, Hartland Point, Lundy Island and south Devon.
- **Coastal erosion** is putting heritage assets and levels of access at risk, which may accelerate in the long-term due to climate change and sea level rise.
- There are a significant number of statutory designations for protecting the marine environment within and adjoining the zone. The inshore part of the zone contains the most **SSSIs** of all English marine plan areas. The offshore marine plan area contains England's only **deepwater habitats**.
- **Priority habitats** include maerl beds, sheltered muddy gravels, intertidal boulder communities, coastal saltmarsh, seagrass beds and intertidal mudflats. Habitats in the zone support an abundance of species, including seabirds, waterfowl, seals, cold-water corals and basking shark.
- **30 MCZs** are present in Zone M7.

- The zone has a diverse range of **seascape types** which reflect the interplay of the zone's topography, geology, biodiversity, land uses and cultural heritage. Seven **National Landscapes** lie within or adjacent to the zone. **Exmoor National Park** also covers the coastline of west Somerset and part of north Devon.
- **Water quality** is a continuing issue in the zone, with bathing water quality seeing fluctuations.
- With regards to **marine litter**, the south west inshore marine plan area has the highest densities of marine zones of beached litter, attributed to pressure from tourism and fishing as well as litter entering UK waters through prevailing currents.
- In the last ten years there have been significant coastal **flood events** in this period which have impacted on key transport infrastructure in the region.
- Particular challenges facing the **water environment** relevant to coastal areas include climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

25. Zone M8: North West England

Overview of Zone M8

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for M8

25.1. Overview of Zone M8

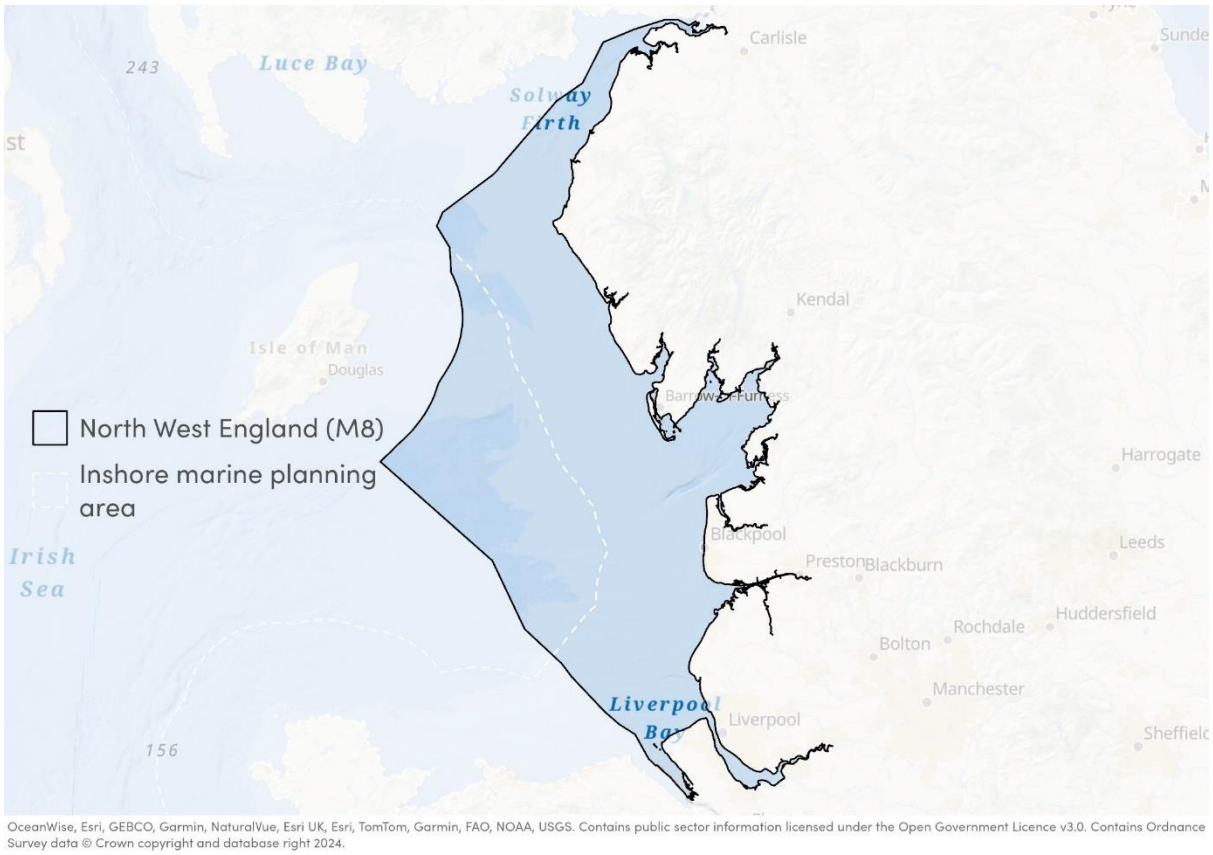

Figure 25.1: Area covered by Zone M8 – North West England

Zone M8 covers the marine area surrounding the north west of England, from the Solway Firth border with Scotland to the River Dee border with Wales (see Figure 25.1 above). It includes the north west inshore and offshore marine plan areas.

The north west inshore marine plan area part of the zone incorporates the coastline stretching from the Solway Firth border with Scotland to the River Dee border with Wales, taking in a total of approximately **4,900 km²** of sea. The Scottish marine area borders this zone to the north, whilst the Welsh marine area borders this zone to the south. The area overlaps with six local authorities, one National Park and two National Landscapes.

The offshore marine plan area part of the zone includes the area from 12 nautical miles extending out to the seaward limit of the EEZ, a total of approximately **2,200 km²** of sea. The marine areas of Scotland, Wales, and the Isle of Man border the north west offshore marine plan area.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

25.2. Air quality

There is **one AQMA** adjacent to the north west inshore area of the zone: **Liverpool City** AQMA, which was declared due to NO_2 levels.

Port activities and ship-source pollutants can be an issue in some port locations, including relating to NOx, SOx and PM_{10}. These are relatively insignificant though, and neither of the main port areas of Liverpool, Birkenhead, Manchester and Heysham are designated AQMAs specifically due to port activities.

25.3. Climate change

Impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projects, in the North West England region winters in the 2070s (2061-2080) could be up to 2.9°C warmer and 22.1% wetter, with summers up to 4.5°C hotter and 30.4% drier. In terms of the warming of the sea, data indicates there has been a sea surface temperature increase of approximately 0.3°C per decade for the last 40 years around the UK[309].

Mean sea level rise around the UK has been between 12-16cm since 1900[310] and sea level projections to 2300 suggest that UK sea levels will continue to rise over the coming centuries under all RCP climate change scenarios. As highlighted by the Met Office, the UK is locked into accelerated sea level rise over this timeframe regardless of trends in greenhouse gas emissions[311].

UK tide gauge records show substantial year to year changes in coastal water levels[312]. Marine data recorded by the **Heysham tidal gauge** indicates that the sea level is expected to rise in this zone by **0.44m by 2100**[313], relative to the 1981-2000 average[314]. This is based on the RCP4.5 emissions scenario[315]; it is noted that projections of sea level change around the UK can vary substantially by climate change scenario.

In addition to sea level rise, climate change has resulted in further impacts to ocean systems that have caused irreversible losses in coastal and open ocean marine ecosystems[316]. The ocean acts as a carbon sink; a natural reservoir that absorbs the atmosphere's carbon through physical and biological means. It is estimated that the ocean absorbs approximately 30% of carbon dioxide that is released into the atmosphere; when it is absorbed by seawater, a series of chemical reactions occur which result in

[309] National Oceanography Centre (2023): New report predicts UK oceans to warm by more than three degrees by 2100
[310] Horsburgh, K. et al. (2020): Impacts of climate change on sea-level rise relevant to the coastal and marine environment around the UK
[311] Met Office (2019): UK sea level projections to 2300
[312] Met Office (2018): UKCP18 Marine report
[313] This is the 50th percentile figure and has been selected as it is a stable measurement to evaluate long-term trends.
[314] Met Office (no date): UKCP data
[315] RCP4.5 assumes that global emissions peak around 2040 and then decline, leading to a moderate level of climate change. To achieve this emissions scenario, global climate policies focused on reducing greenhouse gas emissions through technological innovation and sustainable practices will be required. RCP4.5 is often used in climate modelling to assess future climate impacts and to guide policy decisions.
[316] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability

ocean acidification[317]. Human-induced climate change has caused further ocean acidification – open ocean surface pH has declined between 0.017–0.027 pH units per decade since the last 1980s[318]. This impacts upon the ecosystems within the ocean, and can have a further impact upon food production due to changes in the distribution and abundance of fish populations. Additionally, climate change has an impact on extreme wave height (linked to coastal erosion and flooding), and marine heat-related events; it is reported that marine heatwaves have doubled in frequency, have become longer lasting, and are more intense. This results in widespread coral bleaching and reef degradation[319] - which can further impact upon the loss of marine biodiversity.

In terms of **climate change mitigation**, the north west marine plan areas are important for energy production, including nuclear energy and renewable energy production, with a significant number of **offshore wind projects**. Much of the north west offshore marine plan area, and part of the inshore marine plan area, are high potential future development areas (fixed foundation) for offshore wind.

25.4. Community wellbeing

The communities that border this zone have a strong maritime heritage and are intrinsically linked to the marine area in Zone M8. Communities are predominantly urban, including Whitehaven, Barrow-in-Furness, Morecambe, Haysham, Blackpool, Southport, Liverpool, and Birkenhead.

The **ports** of the north west play an important role in supporting the wide range of industries within and adjacent to the marine plan areas, in addition to passenger services across the Irish Sea and freight transport. These include Liverpool, Birkenhead, Manchester and Heysham, as well as the coastal towns of Whitehaven, Workington, Silloth, Barrow-in-Furness, and Garston.

Fishing activity in the zone primarily target shellfish species, benefiting from the significant shellfish beds in the area.

The key fishing ports in the zone and the tonnage and value of **fish landed in 2023** is set out in Table 25.1 overleaf. Other key fishing ports in the zone include Barrow-in-Furness, Morecambe Bay, and Maryport.

Table 25.1: Tonnage and value of all fish landed in 2022 at important ports for fisheries landings in Zone M8 (source: UK Sea Fisheries Statistics 2022)

Port	Quantity ('000 tonnes)	Main species landed	Value (£ million)
Fleetwood	0.9	Whelks	1.4
Whitehaven	1.1	Scallops	2.5

[317] NOAA (2020): Ocean acidification
[318] IPCC (2019): Special Report on the Ocean and Cryosphere in a Changing Climate
[319] United Nations (no date): How is climate change impacting the world's ocean

Several **cables** cross the Irish Sea link England with Ireland, Northern Ireland and a power interconnector to the Isle of Man. As relatively small and very busy marine plan areas, space for new infrastructure is relatively limited.

The north west inshore marine plan area contains extensive **danger areas** used by the military for weapons and evaluation activities. There are a large number of coastal sites with associated danger and military exercise areas used for firing ranges and ordnance disposal.

Tourism and recreation are important and well-established sectors within the north west marine plan areas, with the potential to expand and diversify. There are several large coastal tourist resorts, for example Blackpool, Southport and Morecambe, and a network of smaller resorts along the coast. Award-winning sandy beaches, coastal landmarks, such as Liverpool's historic waterfront, links golf courses, wildlife reserves, and the Lake District National Park all attract a variety of tourists and recreational users. The distinctive and iconic views across the marine plan areas and extensive cultural and heritage assets, for example historic wrecks, are also major attractions to the area.

25.5. Cultural heritage and historic environment

There are large numbers of **heritage assets** in the immediate vicinity of Zone M8. They include both designated and non-designated heritage assets and include a range of scheduled monuments, listed buildings, registered parks and gardens, and registered battlefields. The settings of many of these assets (and their significance) are heavily influenced by the marine environment.

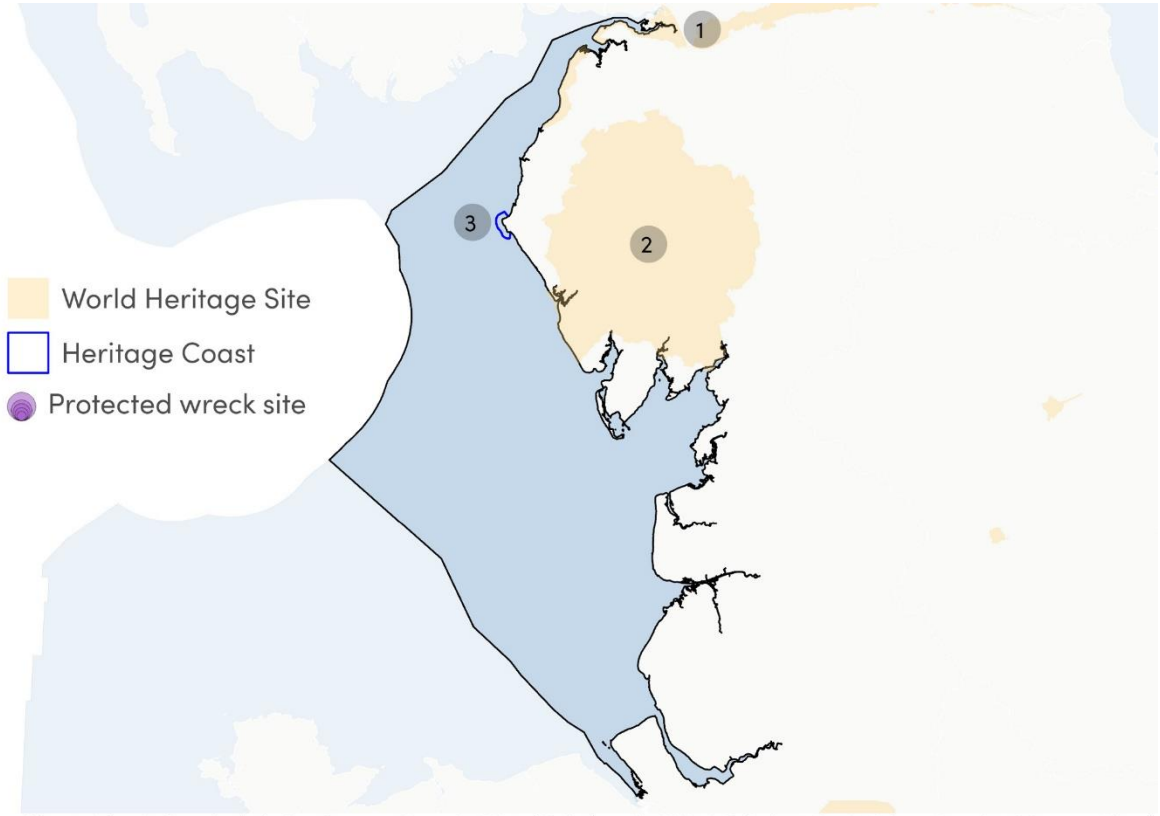

Figure 25.2: Designated heritage assets within Zone M8

A small part of **two WHSs** fall within Zone M8 (as shown in Figure 25.2 above):

- The **Frontiers of the Roman Empire (Hadrian's Wall)** (**1**)
- The **Lake District** (**2**).

Notably, the Liverpool Maritime Mercantile City – which is adjacent to the zone – was removed as a WHS in 2021 due to the irreversible loss of attributes conveying the outstanding universal value of the property.[320]

Heritage coasts have been established to conserve the best stretches of undeveloped coast in England and Wales. There is one heritage coast in this zone: **St Bees Head** (**3**) (as shown in Figure 25.2 above).

In terms of **archaeology**, there is an abundance and variety of archaeological remains in the offshore area of the zone. For example, Formby beach hosts culturally and historically significant Mesolithic period human and animal footprints.

Given the location of the zone in the North Sea, and the topography and geomorphology of the coastline, there are significant numbers of sites of **shipwrecks**. Particular clusters of protected wreck sites include off the coast of Liverpool.

Coastal erosion is putting heritage assets and levels of access at risk, which may accelerate in the long-term due to climate change and sea level rise.

25.6. Ecology and biodiversity

Zone M8 contains a diverse range of **habitats and species**. There are a significant number of statutory designations for protecting the marine environment within and bordering the zone, which are discussed overleaf.

The mainly sedimentary coastline of the north west inshore marine plan area supports internationally significant populations of **seabirds** and **waterfowl**, such as little tern, red-throated diver and whooper swan. **St Bees Head**, for example, is important for migratory seabirds which breed there from April to July.

The north west marine plan areas are of particular importance to numerous **bird species**, reflected in the number of statutory and non-statutory designated sites. They include one of the only two entirely marine SPAs, **Liverpool Bay**, in England, which supports red-throated diver and common scoter.

Coastal areas are characterised by estuaries in the north and south with Morecambe Bay, the largest area of continuous intertidal mudflats and sandflats in the UK[321], in the centre. The estuaries of the north west inshore marine plan area are important for **migratory fish**, for example smelt, eel, trout and salmon, and are breeding grounds for commercially important fish species.

[320] UNESO (2021): World Heritage Committee deletes Liverpool – Maritime Mercantile City from UNESCO's World Heritage List

[321] JNCC (no date): Morecambe Bay

The offshore marine plan area is characterised by muds, sands and gravels, which support a variety of benthic species and provide important **spawning, nursery and feeding grounds** for a range of fish species. The **Solway Firth**, for example, is an important nursery ground for bass, pollack and some flatfish species.

Areas to thee west of the Isle of Man support a variety of species, such as sea urchins, starfish, burrowing anemones, molluscs, and commercially important species such as Norway lobsters.

Priority habitats along the coastline include coastal and floodplain grazing marsh, coastal saltmarsh, mudflats, lowland raised bog, coastal sand dunes, coastal vegetated shingle, saline lagoons, lowland heathland, maritime cliff and slope, deciduous woodland, lowland dry acid grassland, good quality semi-improved grassland, and purple moor grass and rush pastures. Habitats in the zone support an abundance of **species**, including numerous bird species, fish species, and benthic species.

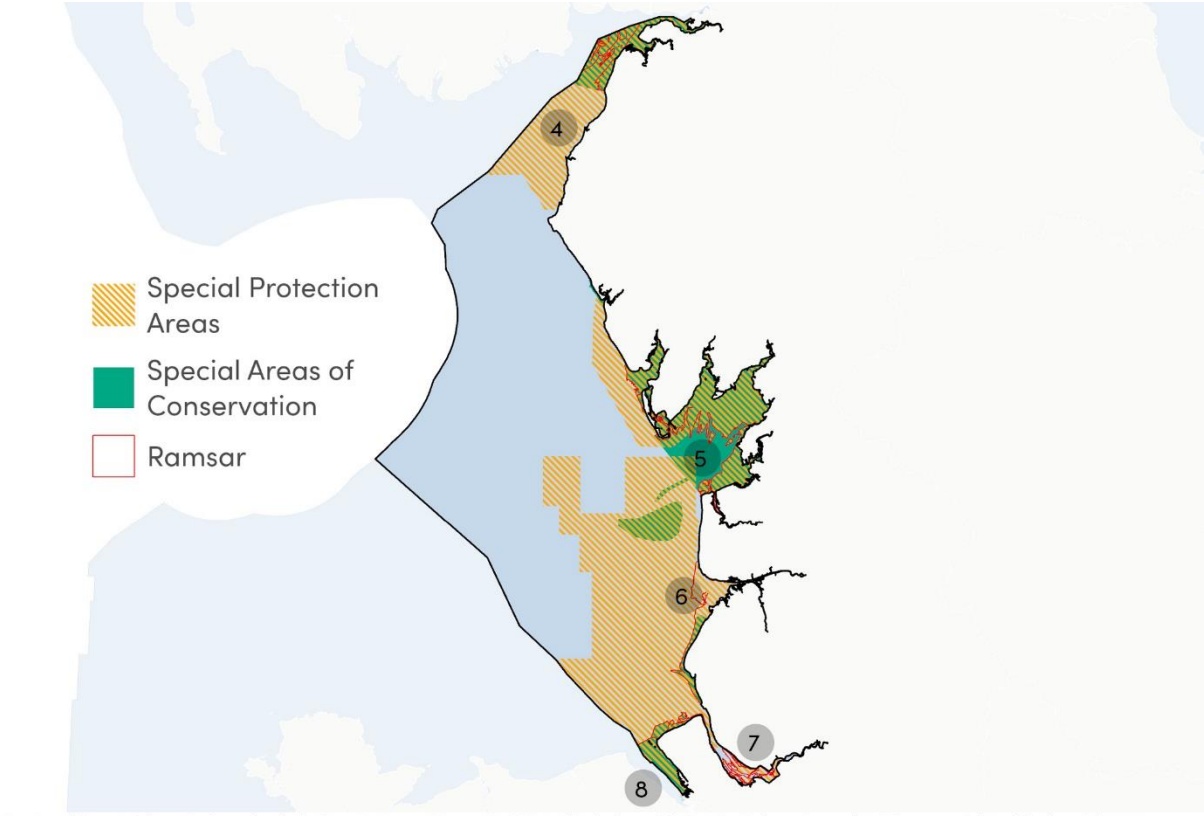

Figure 25.3: Internationally designated sites for biodiversity in Zone M8

A significant proportion of Zone M8 is designated for its biodiversity value. Internationally designated sites for biodiversity – **SACs**, **SPAs** and **Ramsar sites** – in Zone M8, as shown in Figure 25.3 above, include:

- The Solway Firth (**4**)
- Duddon Estuary
- Morecambe Bay (**5**)
- Ribble & Alt Estuaries (**6**)

- Mersey Estuary (**7**)
- Dee Estuary (**8**)

Nationally designated sites for biodiversity, including **SSSIs** and **NNRs**, are also located throughout Zone M8 (see Figure 25.4 overleaf). These include (but are not limited to):

- Upper Solway Flats & Marshes (**9**)
- Duddon Estuary
- Morecambe Bay (**10**)
- Lune Estuary (**11**)
- Ribble Estuary (**12**)
- Sefton Coast
- Mersey Estuary (**13**)
- Dee Estuary (**14**)

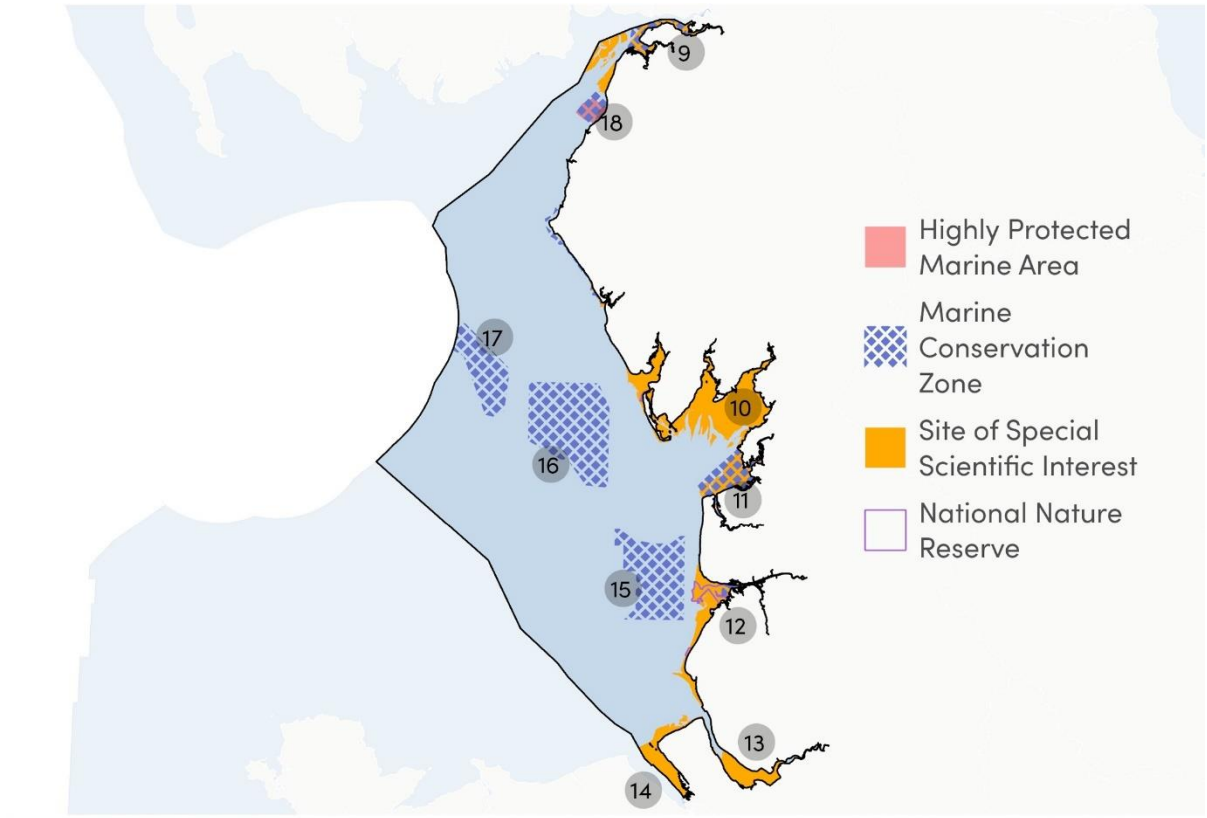

Figure 25.4: Nationally designated sites for biodiversity in Zone M8

There are **eight MCZs** in Zone M8 (as shown in Figure 25.4 above), which are:

- Ribble Estuary (**12**)
- Fylde (**15**)
- Wyre-Lune (**11**)
- West of Walney (**16**)
- West of Copeland (**17**)
- Cumbria Coast (Zones 1 and 2)
- Allonby Bay (**18**)

- Solway Firth

HPMAs are areas of the sea (including the shoreline) that allow the protection and full recovery of marine ecosystems. By setting aside some areas of sea with high levels of protection, HPMAs will allow nature to fully recover to a more natural state, allowing the ecosystem to thrive. There is **one HPMA** in Zone M8 (see Figure 25.4 above), which is:

- **Allonby Bay** (**18**) consists of a mix of habitats, characteristic of an environment that is subject to dramatic currents and tides.[322] The seabed here consists of a range of rocky habitats and sediment dominated habitats. The nutrient-rich sediments, dense mussel beds and intertidal rocky habitats in this area attract large densities of shore birds including species such as curlew and oystercatcher. The biodiverse subtidal habitats provide a food source for fish species, such as flat fish, and nursery areas for other species. In turn, these fish species attract diving, foraging seabirds including guillemots, gannets and razorbills. One of the best examples of honeycomb worm reefs in the UK is found here. Honeycomb worms create a complex sediment network of tubes attached to rock, providing vital habitat for a range of species including crabs and molluscs.

25.7. Land and soil resources

Given the zone is a marine zone, there are no specific elements to highlight for this theme relating to Zone M8. However, the zone contains an MMO licensed **aggregate** dredging area, as well as areas of future technical opportunity for marine aggregates.

25.8. Landscape and seascape

The north west marine plan areas have a variety of **seascape features**. The sea is highly visible from the land in many parts of the north west, with iconic views of Scotland, Wales, the Isle of Man, and the Irish Sea.

The Seascape Character Assessment for the north west marine plan areas[323] identifies **nine MCAs** in the north west marine plan areas: Solway Firth (England), St Bees to Haverigg Coastal Waters, Walney Coastal Waters and Duddon Estuary, Morecambe Bay, Blackpool Coastal Waters and Ribble Estuary, Inner Liverpool Bay, Dee and Mersey Estuaries and Coastal Waters, Irish Sea North (England), and Irish Sea South (England).

Two National Landscapes lie within or adjacent to the zone, which are the Solway Coast, to the west of Carlilse, and Arnside & Silverdale, to the north of Lancaster. The Lake District **National Park** also covers part of the coastline to the north of Barrow-in-Furness.

25.9. Water

The zone has no beaches with blue flag status. In addition, there are approximately **25 classified bathing beaches** in the zone, with approximately 92% achieving either sufficient,

[322] UK Government (2023): Highly Protected Marine Areas: Allonby Bay
[323] Marine Management Organisation (2018): Seascape Character Assessment for the North West Inshore and Offshore marine plan areas

good or excellent status. Locations where the latest (2024) classification is 'poor' water quality or otherwise 'bathing is not advised' include Blackpool North and St Annes North.

There are a number of challenges to maintaining good **water quality** in the north west inshore marine plan area, notably from **run-off** from agricultural land towards the north of the plan area, including from sheep grazing on saltmarsh, and from **diffuse pollution** and **waste water management** from the large catchment areas such as Liverpool, Preston and Blackpool. All the above can also be exacerbated by periods of heavy rainfall, which can put pressure on the sewage systems, resulting in combined sewer overflows operating more frequently. Heavy rainfall is also more likely to flush pollutants from agricultural and urban land into rivers and the sea.

With regards to **marine litter**, the beaches in the north west have a higher-than-average concentration of food and drinking packaging.

In the last ten years there have been significant **coastal flood events** in this period which have impacted on key transport infrastructure in the region, including Storm Aileen (September 2017), which caused flooding across north west England. In addition, in February 2014 a storm generated a skew surge of between 0.25–0.75m at many sites along the UK west coasts. Water levels exceeded the 1 in 5-year return level at 8 sites along the west coast. The second largest return period of 1 in 20 years was at Workington. The highest skew surge was at Workington and was 0.62m.

As highlighted in the North West River Basin District River Basin Management Plan[324], particular **challenges facing the water environment** relevant to coastal areas include: climate change; the loss of wetland habitats and threats to freshwater and wetland species; physical modifications; pollution from agriculture and rural areas; pollution from water industry waste water; invasive non-native species; pollution from towns, cities and transport; changes to water levels and flows; chemicals in the water environment; pollution from abandoned mines; and plastic pollution.

25.10. Key issues for Zone M8

The following key issues have been identified through the review of the baseline information for Zone M8:

- Marine data recorded by the Heysham tidal gauge indicates that the **sea level** is expected to rise in this zone by 0.44m by 2100, relative to the 1981-2000 average.
- The zone is important for **energy production**, including nuclear energy and renewable energy production, with a significant number of offshore wind projects.
- The **ports** of the north west play an important role in supporting the wide range of industries within and adjacent to the marine plan areas, in addition to passenger services across the Irish Sea and freight transport. These include Liverpool, Birkenhead, Manchester and Heysham, as well as the coastal towns of Whitehaven, Workington, Silloth, Barrow-in-Furness, and Garston.

[324] UK Government (2022): North West River Basin District River Basin Management Plan

- **Fishing** activity in the zone primarily target shellfish species, benefiting from the significant shellfish beds in the area. Key fishing ports include Whitehaven, Barrow-in-Furness, Fleetwood, Morecambe Bay and Maryport.
- Several **cables** cross the Irish Sea link England with Ireland, Northern Ireland and a power interconnector to the Isle of Man.
- The north west inshore marine plan area contains extensive **danger areas** used by the military for weapons and evaluation activities.
- **Tourism and recreation** are important and well-established sectors within the zone, with the potential to expand and diversify.
- There are significant numbers of sites of **shipwrecks** in the zone, including off the coast of Liverpool.
- A significant proportion of the north west's coastline is designated for its **biodiversity** value. International designations in or adjacent to the zone include the Solway Firth, Duddon Estuary, Morecambe Bay, Ribble & Alt Estuaries, Mersey Estuary, and the Dee Estuary.
- The zone is of particular importance for numerous **bird species**.
- The zone is characterised by muds, sands and gravels, which support a variety of **benthic species** and provide important spawning, nursery and feeding grounds for a range of **fish species**.
- The **Lake District National Park** covers part of the coastline, and two **National Landscapes** are within or adjacent to the zone.
- There are a number of challenges to maintaining good **water quality** in the north west inshore marine plan area, notably from run-off from agricultural land towards the north of the plan area, including from sheep grazing on saltmarsh, and from diffuse pollution and waste water management from the large catchment areas such as Liverpool, Preston and Blackpool.

26. Zone M9: Wales

Overview of Zone M9

Air quality

Climate change

Community wellbeing

Cultural heritage and historic environment

Ecology and biodiversity

Land and soil resources

Landscape and seascape

Water

Key issues for Zone M9

26.1. Overview of Zone M9

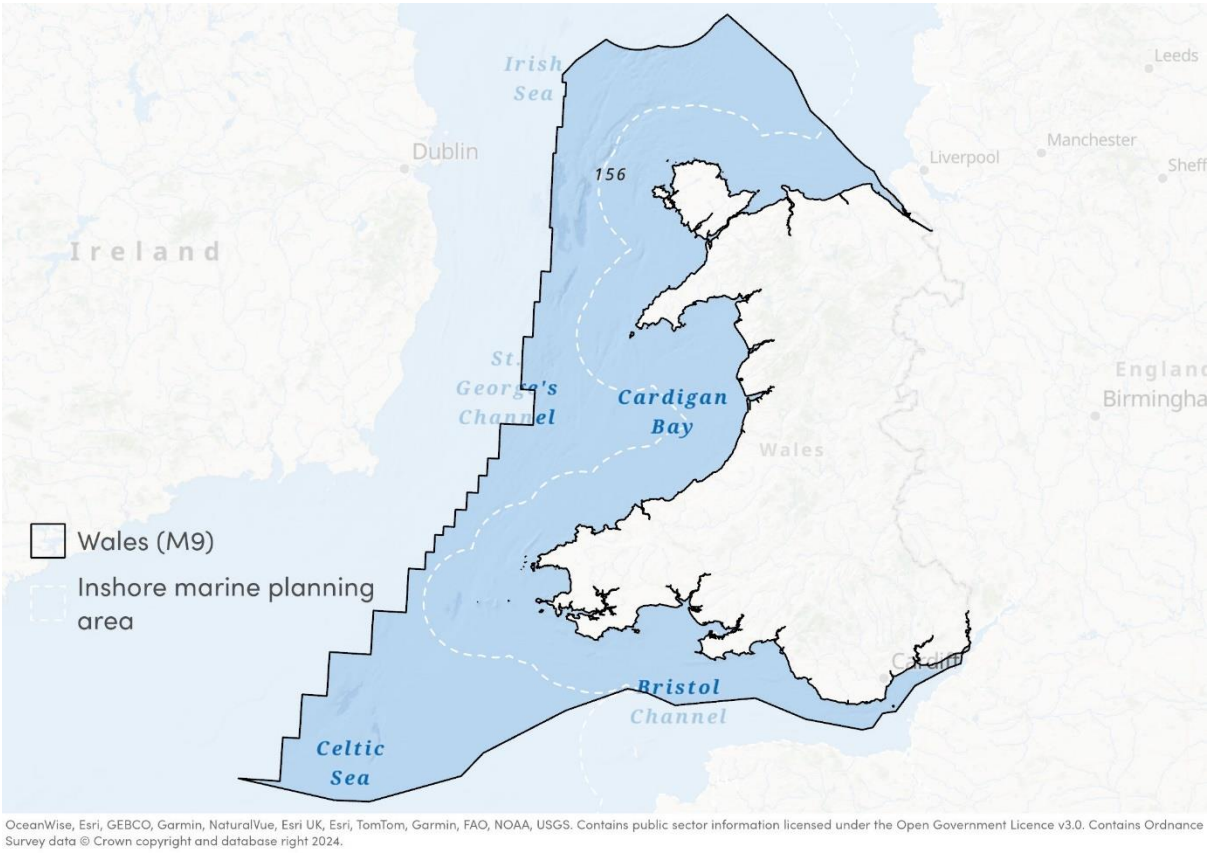

Figure 26.1: Area covered by Zone M9

Zone M9 covers the marine area surrounding Wales, from the River Dee estuary in the north to the Severn Estuary in the south (see Figure 26.**1** above). It includes the Welsh inshore and offshore marine planning areas.

The Welsh inshore marine planning area includes the area from mean high water spring tides out to 12 nautical miles, whilst the offshore marine planning area includes the area beyond 12 nautical miles, extending to the south west into the Celtic Sea. The marine areas of England and Ireland border the Welsh offshore marine planning area.

The zone overlaps with, or is in close proximity to, 15 unitary county / county borough council areas, two National Parks, five National Landscapes, and four WHSs.

Key aspects of the baseline are set out below, with specific locations discussed indicated on the accompanying maps.

26.2. Air quality

Port activities and ship-source pollutants can be an issue in some port locations, including relating to NOx, SOx and PM_{10}. These are relatively insignificant though, as there is no known significant exceedance of emissions due to port activities in the main port areas in the zone.

The industrial area near the port at **Port Talbot** is designated as an **AQMA** for exceedances in the 24 hour mean concentration of 50µg/m^3 for PM_{10}, which is largely linked to industrial activity in the area.[325] There is some potential for port activity to adversely contribute to the overall poor air quality in the area.

26.3. Climate change

Impacts from climate change are likely to be diverse. According to the Met Office UK Climate Projects, in Wales winters in the 2060s and 2070s could be up to 2.9°C warmer and 20.2% wetter, with summers up to 4.7°C hotter and 37% drier. In terms of the warming of the sea, data indicates there has been a sea surface temperature increase of approximately 0.3°C per decade for the last 40 years around the UK[326].

Mean sea level rise around the UK has been between 12-16cm since 1900[327] and sea level projections to 2300 suggest that UK sea levels will continue to rise over the coming centuries under all RCP climate change scenarios. As highlighted by the Met Office, the UK is locked into accelerated sea level rise over this timeframe regardless of trends in greenhouse gas emissions[328].

UK tide gauge records show substantial year to year changes in coastal water levels[329]. Marine data recorded by the **Mumbles tidal gauge** indicates that the sea level is expected to rise by **0.53m by 2100**, and the **Holyhead tidal gauge** indicates that sea level is expected to rise by **0.44m by 2100**[330], relative to the 1981-2000 average[331]. This is based on the RCP4.5 emissions scenario[332]; it is noted that projections of sea level change around the UK can vary substantially by climate change scenario.

In addition to sea level rise, climate change has resulted in further impacts to ocean systems that have caused irreversible losses in coastal and open ocean marine ecosystems[333]. The ocean acts as a carbon sink; a natural reservoir that absorbs the atmosphere's carbon through physical and biological means. It is estimated that the ocean absorbs approximately 30% of carbon dioxide that is released into the atmosphere; when it is absorbed by seawater, a series of chemical reactions occur which result in

[325] Welsh Government (no date): Air pollution data in Port Talbot
[326] National Oceanography Centre (2023): New report predicts UK oceans to warm by more than three degrees by 2100
[327] Horsburgh, K. et al. (2020): Impacts of climate change on sea-level rise relevant to the coastal and marine environment around the UK
[328] Met Office (2019): UK sea level projections to 2300
[329] Met Office (2018): UKCP18 Marine report
[330] This is the 50th percentile figure and has been selected as it is a stable measurement to evaluate long-term trends.
[331] Met Office (no date): UKCP data
[332] RCP4.5 assumes that global emissions peak around 2040 and then decline, leading to a moderate level of climate change. To achieve this emissions scenario, global climate policies focused on reducing greenhouse gas emissions through technological innovation and sustainable practices will be required. RCP4.5 is often used in climate modelling to assess future climate impacts and to guide policy decisions.
[333] IPCC (2022): Climate Change 2022: Impacts, Adaptation and Vulnerability

ocean acidification[334]. Human-induced climate change has caused further ocean acidification – open ocean surface pH has declined between 0.017–0.027 pH units per decade since the last 1980s[335]. This impacts upon the ecosystems within the ocean, and can have a further impact upon food production due to changes in the distribution and abundance of fish populations. Additionally, climate change has an impact on extreme wave height (linked to coastal erosion and flooding), and marine heat-related events; it is reported that marine heatwaves have doubled in frequency, have become longer lasting, and are more intense. This results in widespread coral bleaching and reef degradation[336] - which can further impact upon the loss of marine biodiversity.

In terms of **climate change mitigation**, Wales was an early adopter of offshore wind, with North Hoyle being only the second offshore wind project to be commissioned in the UK followed by other developments including the larger scale Gwynt y Môr (576MW) windfarm. Offshore wind currently provides the largest single contribution to marine renewable electricity in Wales[337] with Gwynt y Môr capable of powering around 400,000 homes. Meanwhile, floating wind technology has been identified as offering potential for innovation, with the Pembrokeshire demonstration zone and the deeper waters of the outer Bristol Channel and Celtic Sea cited as possible sites for deployment.[338] The Severn Estuary also provides significant tidal power opportunities.

26.4. Community wellbeing

The communities that border this zone have a strong **maritime heritage** and are intrinsically linked to the marine area in Zone M9. Communities are predominantly rural with several urban areas present, including Rhyl, Colwyn Bay, Llandudno, Bangor, Holyhead, Pwllheli, Porthmadog, Aberystwyth, Fishguard, Milford Haven, Pembroke, Tenby, Saundersfoot, Llanelli, Swansea, Port Talbot, Barry, Cardiff, and Newport.

There are a variety of major and smaller **ports** across Wales, all of which play an important role in transporting freight, providing logistical and service hubs for industry, exploiting the key growth opportunity offered by the cruise industry, and supporting local fishing, tourism and recreation activity.

Milford Haven is the largest port in Wales and the largest liquid bulk port in the UK. Holyhead, Fishguard and Pembroke Dock provide key roll-on roll-off (Ro-Ro) ferry links with Ireland for the whole of the UK and mainland Europe for the transport of passengers and cargo. Newport, Cardiff, Port Talbot and Swansea specialise in bulk shipments.

Examples of smaller but nevertheless significant Welsh ports include Mostyn, which supports offshore wind construction and servicing and the export of aircraft wings (Airbus), and Barry, which supports local chemical industries.

[334] NOAA (2020): Ocean acidification
[335] IPCC (2019): Special Report on the Ocean and Cryosphere in a Changing Climate
[336] United Nations (no date): How is climate change impacting the world's ocean
[337] Welsh Government (2017): Energy generation in Wales: 2016 to 2018
[338] Ibid

The Welsh commercial **sea fishing** sector is a diverse industry active across the inshore and offshore regions with most activities occurring within six nautical miles of the coast. The focus for most vessels is principally on **crustacean** and **molluscan shellfish** (mostly whelks and scallops), but also on a range of **finfish**, notably sea bass, plaice, sole and rays.

The key fishing ports in the zone and the tonnage and value of **fish landed in 2023** is set out in Table 26.1 overleaf.

Table 26.1: Tonnage and value of all fish landed in 2023 at important ports for fisheries landings in Zone M9 (source: UK Sea Fisheries Statistics 2023)

Port	Quantity ('000 tonnes)	Main species landed	Value (£ million)
Milford Haven	1.4	Whelks	3.1
Saundersfoot	1.0	Whelks	1.4

A thriving recreational **sea angling** sector also exists in Wales. A particular characteristic of the Welsh fishing sector is that it comprises mainly small businesses operating from the shore or from small (<10m) vessels operating from dispersed coastal locations. Small vessel and fixed location operations are particularly constrained and therefore vulnerable to disruption and possible displacement.

Tourism and recreation activity in and adjacent to the zone benefits from the high quality, diverse natural environment and cultural distinctiveness that is typical of the Welsh coastline. In recent years certain activities such as wildlife watching and visiting beaches have increased significantly.[339]

A high proportion of resort beaches have Blue Flag and Resort Seaside Award status, whilst the establishment of the Wales Coast Path, as well as rural cycle and riding routes, has helped to underpin and develop existing tourism and recreation activity.

26.5. Cultural heritage and historic environment

There are large numbers of **heritage assets** in the immediate vicinity of Zone M9. They include both designated and non-designated heritage assets and include a range of scheduled monuments, listed buildings and registered parks and gardens.

[339] Natural Resources Wales (2015): Wales Outdoor Recreation Survey

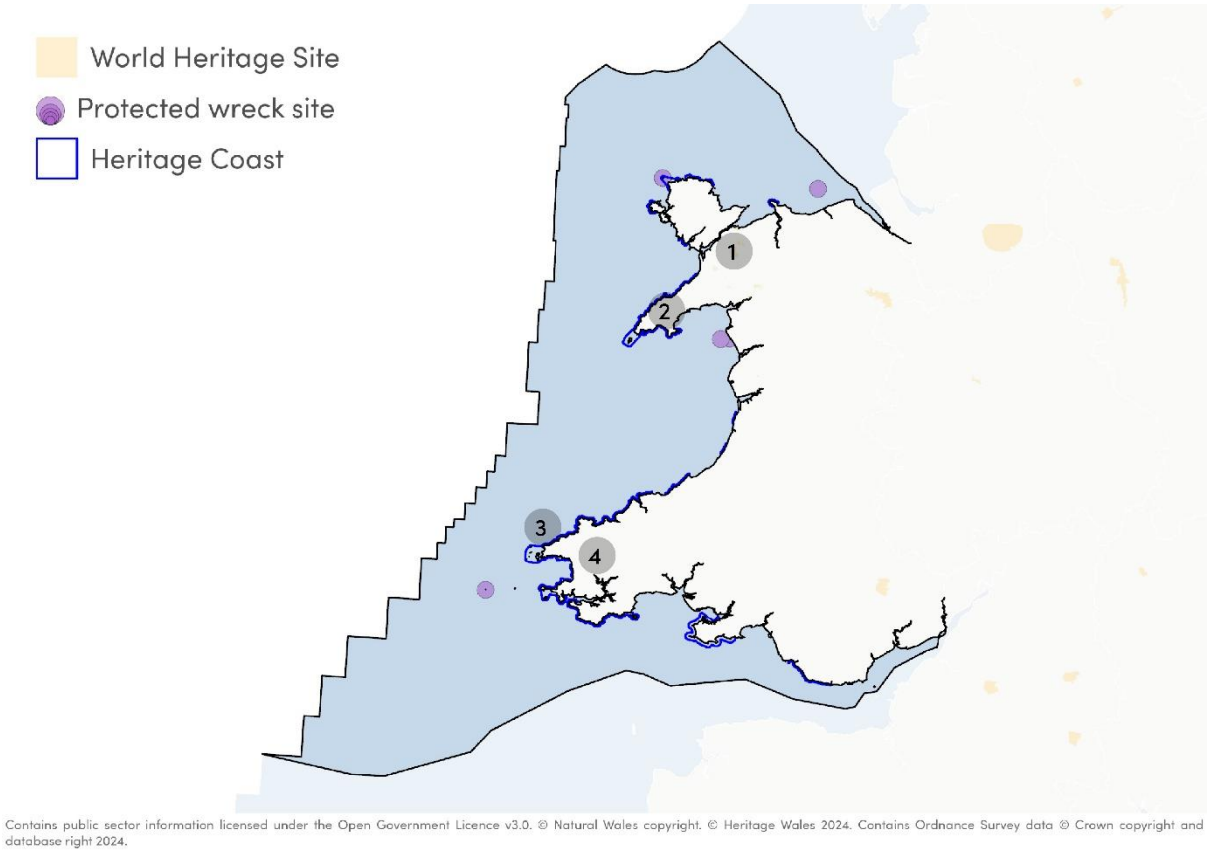

Figure 26.2: Designated heritage assets within Zone M9

There is **one WHS** along the coast in Wales (as shown in Figure 26.2 above):

- The **Castles and Town Walls of King Edward in Gwynedd** (**1**). The castles of Beaumaris and Harlech and the fortified complexes of Caernarfon and Conwy (label same number) are located in the former principality of Gwynedd, in north Wales. These extremely well-preserved monuments are examples of the colonization and defence works carried out throughout the reign of Edward I (1272–1307) and the military architecture of the time. The four castles of Beaumaris, Conwy, Caernarfon, Harlech and the attendant fortified towns at Conwy and Caernarfon are the finest examples of late 13th century and early 14th century military architecture in Europe, as demonstrated through their completeness, pristine state, evidence for organized domestic space, and extraordinary repertory of their medieval architectural form. The setting and significance of the component parts of the WHS are heavily influenced by the marine environment.

Heritage coasts have been established to conserve the best stretches of undeveloped coast in Wales. A proportion of the coastline of the zone is designated as heritage coast (see Figure 26.2 above). The heritage coasts are Great Orme, North Anglesey, Holyhead Mountain, Aberffraw Bay, Llyn (**2**), Ceredigion, St. Dogmaels and Moylgrove, Dinas Head, St. David's Peninsula (**3**), St. Brides Bay, Marloes and Dale, South Pembrokeshire (**4**), Gower and Glamorgan Coast.

In terms of **archaeology**, there is an abundance and variety of archaeological remains in the zone. This includes a numbers of sites of shipwrecks. For example there are clusters of wrecks in Pembrokeshire and Cardigan Bay.

Coastal erosion and increase in sea levels is putting heritage assets and levels of access at risk, which may accelerate in the long-term due to climate change.

26.6. Ecology and biodiversity

Zone M9 contains a diverse range of **habitats and species**. There are a significant number of statutory designations for protecting the marine environment within and bordering the zone, which are discussed overleaf.

Many of the marine species in Wales are nationally and internationally important. For example, Cardigan Bay has one of the largest resident populations of **bottlenose dolphin** in the UK, whilst Skomer and the Pembrokeshire coast is important for breeding **Atlantic grey seals**.[340]

The seabird colonies of Skomer, Skokholm, Bardsey and Grassholm are spectacular, supporting **puffins**, **guillemots**, **razorbills** and approximately 45,000 breeding pairs of **Manx shearwater** (Puffinus puffinus) - the largest breeding population in the world.[341]

The Menai Strait in north Wales is a notable example of a tide-swept channel, having strong tidal currents but sheltered from wave action. The seabed in this high energy environment is colourful and diverse, with filter feeding species including the **breadcrumb sponge** (Halichondria panicea) and **mermaid's glove** (Haliclona oculate), as well as a number of bryozoans, ascidians and hydroids. There is also an abundant population of the l**arge daisy anemone** (Cereus pedunculatus). Other examples of tide-swept channels are found in south-west Wales, in Milford Haven, Jack Sound, Skomer, and Ramsay Sound.[342]

The **pink sea fan** (Eunicella verrucosa) is a nationally protected, slow growing cold-water coral found at its northern limit in Wales at Skomer Island.[343]

Wales's seas are also important for shellfish; **mussels** are grown commercially in the Menai Strait and **cockles** are collected from intertidal areas around Wales.[344]

Priority habitats along the coastline include parkland, lowland fens and reedbeds, lowland calcareous grassland, purple moor grass and rush pastures, lowland dry acid grassland, lowland heathland, upland heathland, parkland, lowland meadows, wood pasture, raised bog, and marsh fritillary.

[340] Wales Biodiversity Partnership (no date): Marine
[341] Ibid
[342] Ibid
[343] Ibid
[344] Ibid

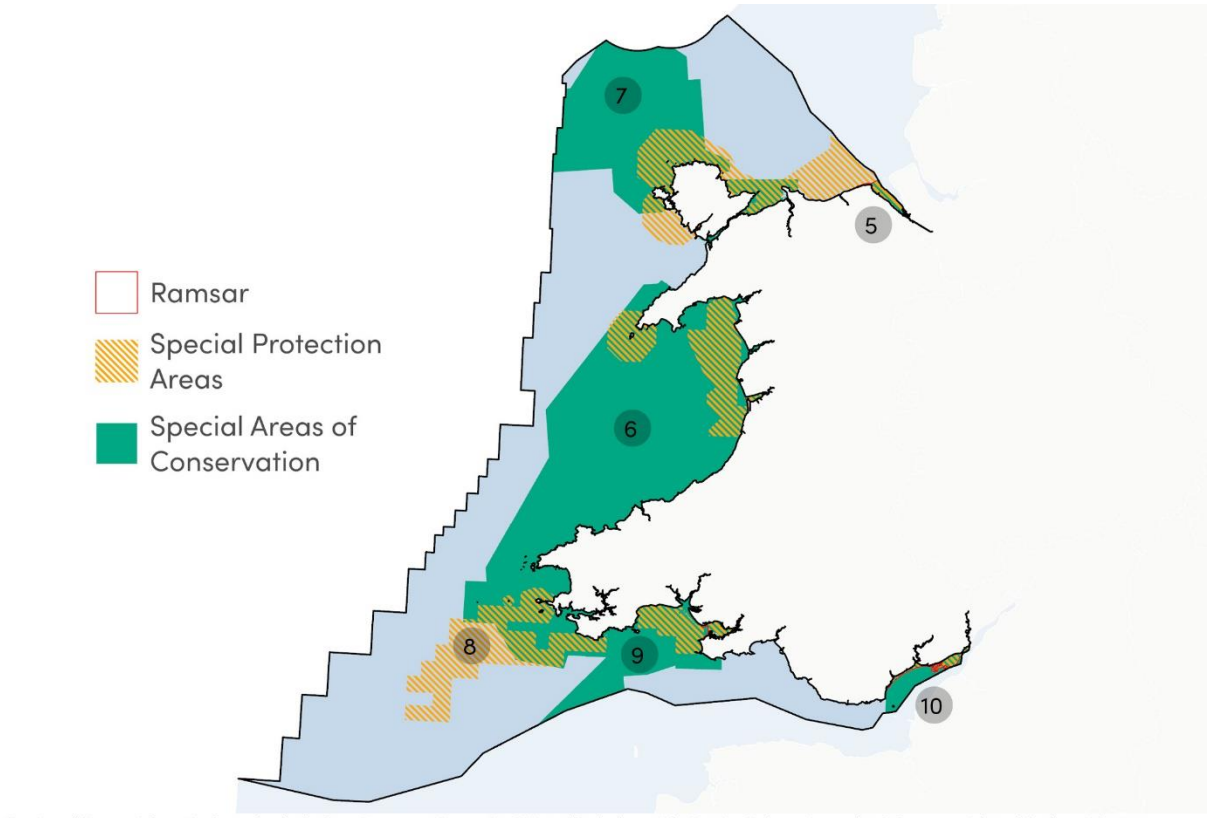

Figure 26.3: Internationally designated sites for biodiversity in Zone M9

A significant proportion of Zone M9 is designated for its biodiversity value. Internationally designated sites for biodiversity – **SACs**, **SPAs** and **Ramsar sites** – in Zone M9, as shown in Figure 26.3 above, include:

- The Dee Estuary / Aber Dyfrdwy (Wales) (**5**)
- Liverpool Bay / Bae Lerpwl (Wales)
- Anglesey Terns / Morwenoliaid Ynys Mon
- West Wales Marine / Gorllewin Cymru Forol (**6**)
- North Anglesey Marine / Gogledd Môn Forol (**7**)
- Glannau Aberdaron ac Ynys Enlli / Aberdaron Coast and Bardsey Island
- Northern Cardigan Bay / Gogledd Bae
- Skomer, Skokholm and the Seas off Pembrokeshire (**8**)
- Bristol Channel Approaches / Dynesfeydd Môr Hafren (**9**)
- Bae Caerfyrddin / Carmarthen Bay
- The Severn Estuary (Wales) (**10**)

Nationally designated sites for biodiversity, including **SSSIs** and **NNRs**, are also located throughout Zone M9 (see Figure 26.4 overleaf). These include (but are not limited to):

- The Dee Estuary / Aber Afon Dyfrdwy
- Traeth Lafan
- Morfa Harlech
- Aber Mawddach / Mawddach Estuary
- Dyfi

- Aber Taf / Taf Estuary (**11**)
- Burry Inlet and Loughor Estuary (**12**)
- The Severn Estuary (**13**)

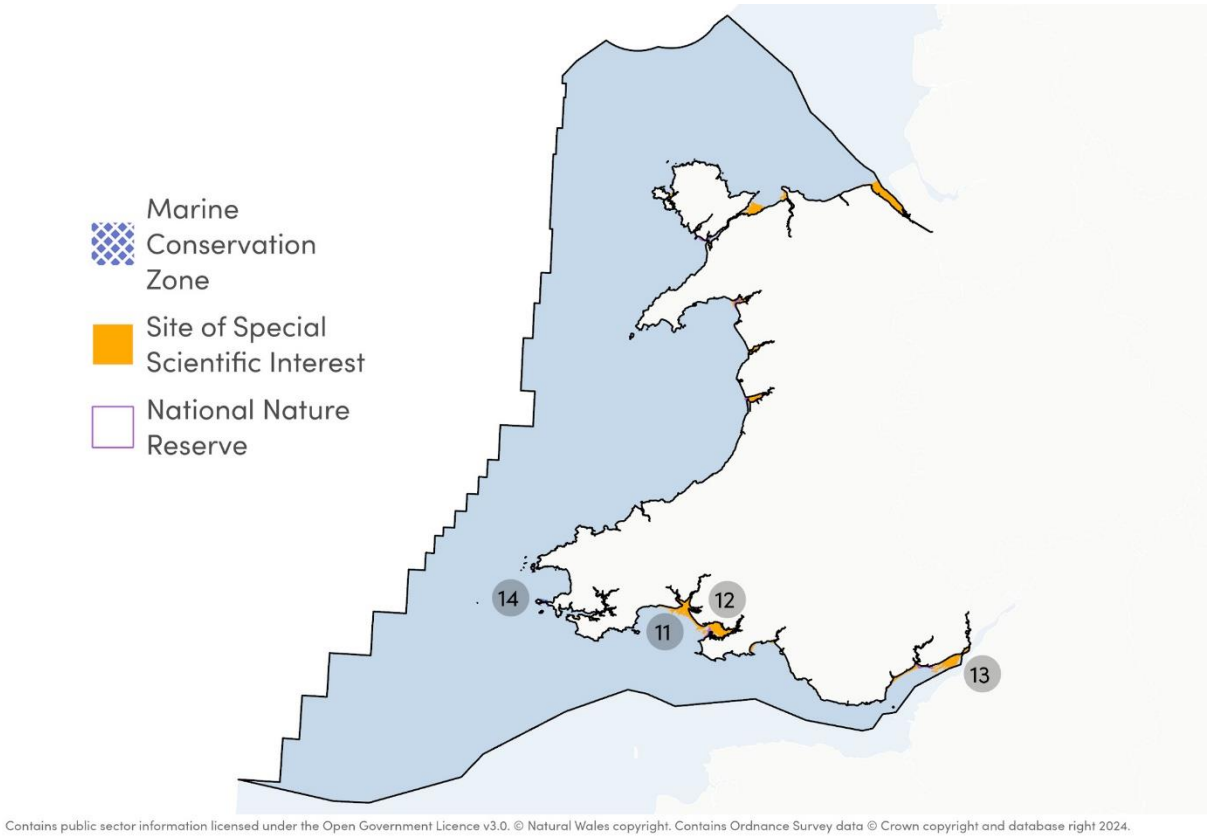

Figure 26.4: Nationally designated sites for biodiversity in Zone M9

There is **one MCZ** in Zone M9, which is Skomer (**14**).

Skomer, the first MCZ in Wales, was established in 2014 and is situated around the island of Skomer and the Marloes Peninsula in Pembrokeshire, south west Wales.[345] Before 2014 the area had been Wales' only Marine Nature Reserve for 24 years. Skomer MCZ has species and habitats of national and international importance. These include grey seal, pink seafan, sponge communities, eelgrass and algal communities.

26.7. Land and soil resources

Given the zone is a marine zone, there are no specific elements to highlight for this theme relating to Zone M9. However, there are **aggregate extraction** sites in the north (near Rhyl) of the zone and along the southern coast (stretching from Tenby to Newport), including the inshore and offshore areas.

[345] Natural Resources Wales (no date): Skomer Marine Conservation Zone

26.8. Landscape and seascape

Wales has a varied coastline with **seascapes** that have been influenced by and support a wide range of activities and uses. Developments in the inshore marine planning region have the potential to change the character around the Welsh coastline.

Natural Resources Wales were commissioned on behalf of Welsh Government to identify the character of Wales's seascapes at a broad scale. They divided the Welsh inshore waters into **29 Marine Character Areas**. These are: Dee Estuary (Wales), Colwyn Bay and Rhyl Flats, Red Wharf and Conwy Bays, North Wales Open Waters, North-West Anglesey Open Waters, North Anglesey Coastal Waters, Holyhead Bay and The Skerries, West Anglesey Open Waters, Hply Island West and Penrhos Bay, Menai Strait, Caernarfon Bay, Llyn and South West Anglesey Open Waters, Llyn and Bardsey Island, Tremadog Bay and Dwyryd Estuary, Cardigan Bay (north) and Estuaries, Cardigan Bay (south), Outer Cardigan Bay, West Pembrokeshire Coastal Waters and Islands, West Pembrokeshire Islands, Bars and Inshore Waters, Irish Sea Open Waters, Milford Haven, South Pembrokeshire Coastal and Inshore Waters, South Pembrokeshire Open Waters, Carmarthen Bay and Estuaries, Gower and Helwick Coastal Waters, Swansea Bay and Porthcawl, Glamorgan Coastal Waters and Nash Sands, Bristo Channel (Wales), and Severn Estuary (Wales).

The zone is adjacent to, or in close proximity to, to all five of the **National Landscapes** in Wales. These are Bryniau Clwyd a Dyffryn, Ynys Mon / Anglesey, Llyn, Gower, and the Wye Valley (Wales). This is in addition to two of the three **National Parks** in Wales: Eryri National Park / Snowdonia and Arfordir Penfro / Pembrokeshire Coast.

26.9. Water

The zone has **24 beaches** with **blue flag status**, which can be attributed to high water quality and good management. There are approximately **110 designated bathing waters** in the zone, with approximately 75 (c.70%) achieving the highest classification of 'excellent' and 2 (1.8%) being classified as 'poor'.[346] Locations where the latest (2024) classification is 'poor' water quality or otherwise 'bathing is not advised' include Ogmore by Sea and Rhyl High Street.

In Wales, 80% of **marine litter** originates from land-based sources and predominantly consists of plastic.[347]

In the last ten years there have been significant **coastal flood events** in this zone, which have impacted on key transport infrastructure in the region, including in February 2014 when Wales faced dangerous and damaging conditions as a result of a combination of storm force winds, high tides, and tidal surges. Prior to this, in January 2014, storms resulted in damages to sea defences, coastal erosion, inundated roads and subsequent disruption to traffic, as well as flooding to residential and non-residential properties. Approximately 110 coastal defences were damaged, including the sea front in

[346] Natural Resources Wales (2024): Wales Bathing Water Report 2024
[347] Welsh Government (no date): Marine litter

Aberystwyth, with an estimated financial impact of £2.8 million.[348] In Pembrokeshire, temporary shingle sea defences were shifted several metres.

26.10. Key issues for Zone M9

The following key issues have been identified through the review of the baseline information for Zone M9:

- Marine data recorded by the Mumbles tidal gauge indicates that the **sea level** is expected to rise by 0.53m by 2100, and the Holyhead tidal gauge indicates that sea level is expected to rise by 0.44m by 2100.
- **Offshore wind** currently provides the largest single contribution to marine renewable electricity in Wales. The Severn Estuary also provides significant tidal power opportunities.
- There are a variety of major and smaller **ports** across Wales, all of which play an important role in transporting freight, providing logistical and service hubs for industry, exploiting the key growth opportunity offered by the cruise industry, and supporting local fishing, tourism and recreation activity.
- The Welsh commercial sea **fishing** sector is a diverse industry active across the inshore and offshore regions with most activities occurring within six nautical miles of the coast. The focus for most vessels is principally on crustacean and molluscan shellfish (mostly whelks and scallops), but also on a range of finfish, notably sea bass, plaice, sole and rays. Milford Haven and Saundersfoot are the largest fishing ports in Wales.
- A thriving recreational **sea angling** sector also exists in Wales. A particular characteristic of the Welsh fishing sector is that it comprises mainly small businesses operating from the shore or from small (<10m) vessels operating from dispersed coastal locations.
- **Tourism and recreation** activity in and adjacent to the zone benefits from the high quality, diverse natural environment and cultural distinctiveness that is typical of the Welsh coastline.
- There are large numbers of **heritage assets** in the immediate vicinity of Zone M9. They include both designated and non-designated heritage assets and include a range of scheduled monuments, listed buildings and registered parks and gardens. The setting and significance of the component parts of the Castles and Town Walls of King Edward in Gwynedd WHS are heavily influenced by the marine environment.
- **Coastal erosion** and increase in sea levels is putting heritage assets and levels of access at risk, which may accelerate in the long-term due to climate change.
- Many of the **marine species** in Wales are nationally and internationally important.
- A significant proportion of the coastline is internationally designated for its **biodiversity** value.
- The zone is adjacent to, or in close proximity to, to all five of the **National Landscapes** in Wales and two of Wales' **National Parks**, Eryri National Park / Snowdonia and Arfordir Penfro / Pembrokeshire Coast.

[348] Natural Resources Wales (2014): Wales Coastal Flooding Review Phase 1 Report – Assessment of Impacts

- There are approximately **110 designated bathing waters** in the zone, with approximately 75 achieving the highest classification of ‘excellent’ and two being classified as ‘poor’.
- In the last ten years there have been significant coastal **flood events** in this zone.

27. SEA framework

What is the SEA framework?
SEA framework

27.1. What is the SEA framework?

A central purpose of the scoping stage of the SEA is the development of an SEA Framework. The SEA Framework is the main tool which will be used to assess SSEP proposals against the baseline information to determine whether or not significant effects are likely to arise.

The SEA Framework will form the methodological structure for assessing the draft SSEP and reasonable alternatives.

The SEA framework consists of:

- **SEA Objectives:** These set out high level objectives which frame the assessment for each SEA theme.
- **Assessment questions:** These are the key questions that will be asked through the assessments undertaken through the SEA.
- **Indicators/information to draw on:** This comprises the key information that will be utilised for the purposes of the assessment. It should be noted that the list as presented is not exhaustive, and any appropriate information which is available will be used for the purposes of the assessment.

The selection of the SEA objectives and assessment questions is based on the following:

1) Consideration of baseline information and the outcomes of the policy, plan and programme review.

2) The key issues and opportunities established through scoping.

3) An understanding of what the SSEP will be seeking to achieve, and what will need to be assessed through the SEA.

The SEA Framework as structured therefore enables a consistent approach to be taken to the assessment, whilst offering flexibilities which recognise the diverse nature of SSEP proposals.

27.2. SEA framework

Table 27.1 below sets out the proposed SEA framework.

Table 27.1 Proposed SEA framework

SEA Objective	Assessment questions: Will the proposed pathway…	Indicators/information to draw on
Air Quality		
Support air quality.	Cause any significant impact on air quality? Facilitate the protection of green infrastructure networks to help ensure continued benefits for air quality are secured through absorption and dissipation of nitrogen dioxide and other pollutants?[349]	Air quality management areas (AQMAs) Monitoring of levels of particulates (PM10 and $PM_{2.5}$), nitrogen dioxide (NO_2), sulphur dioxide (SO_2) and carbon monoxide (Co) Defra and Devolved Administrations' air pollution background concentration maps Green infrastructure

[349] Wider aspects relating to air quality, such as impacts on sensitive habitats from poor air quality, have been considered under the relevant SEA theme.

SEA Objective	Assessment questions: Will the proposed pathway…	Indicators/information to draw on
Climate Change		
Support climate change mitigation through reducing greenhouse gas emissions emitted by the energy system.	Seek to significantly reduce emissions from the energy system in line with the UK ambition to be net zero by 2050 (and associated carbon budgets)? Limit the increase in the carbon footprint from new electricity and hydrogen generation and storage? Reduce energy consumption from non-renewable resources? Limit the loss of and encourage the expansion of key carbon stores?	Greenhouse gas emissions, including associated with the most recent carbon budget Renewable energy capacity Peatland areas Carbon rich soils / peaty soil Woodland coverage
Support the resilience of infrastructure to the potential effects of climate change.	Increase the resilience of electricity generation and hydrogen generation and storage infrastructure to the potential impacts of climate change? Ensure the potential risks associated with climate change are considered through new energy infrastructure programmes which are within SSEP scope? Protect green infrastructure networks to support adaptation to the potential impacts of climate change? Support the undertaking of climate change assessments and, where appropriate, advise and implement appropriate mitigation measures?	Occurrence of extreme weather events Average mean temperature in summer Rainfall averages Green and blue infrastructure Woodland coverage

SEA Objective	Assessment questions: Will the proposed pathway…	Indicators/information to draw on
Community Wellbeing		
Support the vitality of communities.	Enhance the vitality of cities, towns, villages and hamlets? Meet the needs of those living in rural and isolated areas? Support employment opportunities in locations with higher levels of deprivation and unemployment?	Deprivation rates Unemployment rates Local employment in land-based sectors Local employment in tourism Economic Enterprise Zones Fishing density data and zones Aquaculture zones
Improve health and well-being.	Maintain or enhance the quality of life of residents? Avoid any negative impacts to the quality and extent of existing recreational assets, such as formal or informal footpaths? Enhance the provision of, and access to, green infrastructure, in accordance with national standards? Address the needs of all age groups?	Level of health within the local population Recreational assets Rights of way National Trails (Eng & Wales) /Scotland's Great Trails (Scot) Open greenspace Country parks Green infrastructure networks

SEA Objective	Assessment questions: Will the proposed pathway…	Indicators/information to draw on
Cultural Heritage and Historic Environment		
Conserve and enhance the heritage resource, including its historic environment and archaeological assets.	Conserve the outstanding universal value of World Heritage Sites? Conserve and enhance the significance of buildings and structures of architectural or historic interest, both designated and non-designated, and their setting? Conserve and enhance the special interest, character and appearance of conservation areas and their settings? Conserve and enhance archaeological remains and support the undertaking of archaeological investigations and, where appropriate, recommend mitigation strategies? Reinforce historic landscape character? Conserve and enhance the historic environment of marine areas?	World Heritage Sites and Tentative World Heritage Sites Listed buildings Conservation areas Registered parks and gardens (Eng & Wales) and Nationally important gardens and designed landscapes (Scot) Scheduled monuments Registered historic battlefields Register of Historic Landscapes (Wales) National Historic Landscape Characterisation Protected Wreck Sites (Eng & Wales), Historic Marine Protected Areas (Scot) Submerged palaeolandscapes
Protect and safeguard cultural heritage.	Help preserve tangible and intangible cultural heritage? Support access to, interpretation and understanding of the historic environment?	Visitor numbers to key heritage assets Participation in cultural activities

SEA Objective	Assessment questions: Will the proposed pathway…	Indicators/information to draw on
Ecology and Biodiversity		
Protect and enhance habitats and species.	Protect and enhance priority habitats, and the habitat of priority species? Achieve a net gain in biodiversity in line with wider UK/national targets?[350] Increase the resilience of biodiversity to the potential effects of climate change?	Annex I and II Habitats Priority Habitats (Eng) Priority Habitat – High Sensitivity (Wales) Irreplaceable Habitats (Eng) Ancient Woodland Priority species Important Bird and Biodiversity Areas Scottish Priority Marine Features Nature Recovery Network

[350] Whilst there are certain statutory requirements for biodiversity net gain for individual developments, it remains appropriate to consider the topic through the SEA to understand the likely scale and nature of net gain that may be required from proposals.

SEA Objective	Assessment questions: Will the proposed pathway…	Indicators/information to draw on
Support the integrity of designated biodiversity sites.	Avoid harm to internationally designated SACs, SPAs and Ramsar sites? Avoid harm to the condition of SSSIs? Support the conservation objectives of MCZs in England and MCAs in Scotland? Avoid negative impacts on locally designated sites for biodiversity and geodiversity? Support access to, interpretation and understanding of biodiversity?	SPAs, SACs, Ramsar sites, Candidate SACs Possible SACs Potential SPAs Proposed Ramsar sites (note: HRA will be the key source of information) SSSIs and SSSI condition Marine Conservation Zones and objectives and Marine Conservation Area objectives (note: MCZ assessment will be the key source of information) Local Wildlife sites National Nature Reserves and Local Nature Reserves
Increase ecological connectivity	Minimise the impact of electricity and hydrogen generation and storage infrastructure on the fragmentation of habitats and ecological networks? Increase the resilience of biodiversity to the effects of climate change, including through enhancements to ecological networks? Increase the resilience of biodiversity to the potential effects of climate change?	Habitat Network Maps (Eng) Priority Ecological Networks (Wales) Nature Networks (Scotland) Local Nature Recovery Areas

SEA Objective	Assessment questions: Will the proposed pathway…	Indicators/information to draw on
Land and Soil Resources		
Conserve and enhance geodiversity and geoheritage.	Safeguard key geodiversity assets? Enhance understanding and awareness of geodiversity assets?	UNESCO Global Geoparks Regionally Important Geological sites (Eng) Regionally Important Geodiversity sites (Wales) Geological Conservation Review Sites (Scot)
Promote the efficient use of land.	Facilitate the use of previously developed land?	Greenfield and previously developed land.
Protect soil and land resources?	Limit the loss of the best and most versatile agricultural land (Grade 1 to 3a agricultural land)? Protect the integrity of areas safeguarded for mineral resources?	Best and most versatile agricultural land. Mineral safeguarding areas and mineral consultation zones
Promote sustainable waste management solutions that encourage the reduction, re-use and recycling of waste during construction.	Encourage recycling of materials and minimise consumption of resources during construction, operation and maintenance of new infrastructure?	Potential waste arisings from construction, operation and maintenance of energy infrastructure Use of reused or recycled materials in new infrastructure
Support the management of coastal change.	Factor in coastal change which is occurring in the area being considered?	Coastal processes, including erosion

SEA Objective	Assessment questions: Will the proposed pathway…	Indicators/information to draw on
Landscape and Seascape		
Protect and enhance the character and quality of landscapes, townscapes and villagescapes.	Reinforce the special qualities of National Parks and reflect National Park Authorities' purposes and duty? Support the special qualities and management objectives of the National Landscapes and National Scenic Areas? Support the five purposes of the Green Belt? Conserve and enhance locally important landscape, townscape and villagescape features?	National Parks (including special qualities and National Park Authority purposes and duty) National Scenic Areas (Scot) National Landscapes (Eng & Wales) Wild land (Scot) Green Belt Grey Belt Landscape character assessments
Protect and enhance seascape character.	Protect and enhance the character of coastal and marine areas?	Heritage Coast Landscape and seascape character assessments
Limit noise pollution and support tranquillity.	Limit noise pollution from new electricity provision? Minimise the impact on and seek to improve areas of tranquillity?	Noise pollution Landscape character assessments Tranquillity ratings

SEA Objective	Assessment questions: Will the proposed pathway…	Indicators/information to draw on
Limit light pollution and protect dark skies.	Limit the impact of energy infrastructure on the quality of dark skies?	Light pollution Dark sky and tranquillity ratings Dark sky reserves
Water		
Minimise the impact which energy infrastructure has on water quality and availability and on the physical state of water bodies.	Support improvements to water quality? Protect coastal and marine water quality? Protect groundwater resources? Protect drinking water supplies, including water bodies of strategic significance for water supply? Minimise physical alterations to water bodies?	Biological and chemical water quality of watercourses Source Protection Zones (Eng & Wales) Drinking Water Protected Areas (Scot) Water consumption of infrastructure Bathing water quality Water consumption of infrastructure
Limit the risk of flooding, including fluvial, groundwater, surface water, coastal, reservoir and canal flooding.	Ensure that inappropriate development does not take place in areas at higher risk of flooding, taking into account the likely future effects of climate change? Sustainably manage water run-off, reducing surface water runoff? Promote a coordinated approach to the management of flood risk across energy infrastructure provision?	Flood Risk Zones (Eng) Development Advice Zones for Flood Risk (Wales) Flood maps (Scot) Areas benefitting from flood defences (including coastal defences)

28. Next steps

Subsequent stages of the SEA process

Consultation on the Scoping Report

28.1. Subsequent stages of the SEA process

Scoping is the current stage in a multiple-stage plan-making / SEA process.

The next stage will involve appraising 'reasonable alternatives' for a range of SSEP issues and feeding back initial findings so that they might be considered when preparing the draft SSEP.

For the SSEP, NESO will develop several "pathway options". These will comprise options for how the energy system could look in the future to meet the objectives for the SSEP.

A wide range of pathway options will initially be modelled from an economic, environmental, societal and technical perspective. These will subsequently be narrowed down to in the region of four to six pathway options. The shortlisted pathway options, which will be presented to the UK Energy Secretary, will be a focus of the reasonable alternatives work for the SEA. This is with the aim of enabling the findings of the assessment to inform, with the other evidence base studies undertaken for the SSEP, the choice of preferred pathway option.

Following the choice of the preferred pathway option (as modified), the SEA Environmental Report will be prepared for the SSEP.

In accordance with the SEA Regulations and Environmental Assessment (Scotland) Act, the Environmental Report must contain a range of specified information including:

- An appraisal of the draft SSEP and reasonable alternatives.
- 'Outline reasons for selecting the alternatives dealt with'.
- Other information including a summary of the SEA scope and a description of 'measures envisaged for monitoring'.

The purpose of providing this information in the Environmental Report is to inform both:

- Those who might want to make representations on the draft SSEP approach / alternatives.
- Those tasked with finalising the SSEP.

Subsequent to consultation on the draft SSEP / Environmental Report, updates will be made to the plan, and where appropriate further SEA work will be undertaken.

At adoption, an SEA Adoption Statement will be prepared. The purpose of the SEA Adoption Statement is to highlight the reasons for choosing the preferred plan in light of other reasonable alternatives; how environmental considerations have been integrated into the SSEP's development process; how consultation responses have been considered; and to highlight what measures have been taken to monitor the significant environmental effects of the SSEP.

The SEA as it progresses will be informed by the latest available baseline information. In this respect the information presented in this Scoping Report will evolve, ensuring that the SEA process is underpinned by a robust evidence base.

28.2. Consultation on the Scoping Report

At this scoping stage, the SEA Regulations require consultation with consultation bodies, but not full consultation with the public.

The Scoping Report has been issued to the consultation bodies for England, Scotland and Wales, as well as Northern Ireland and the Republic of Ireland – in account of transboundary effects. These are detailed below:

- **England** – Environment Agency, Historic England and Natural England.
- **Scotland** – Historic Environment Scotland, NatureScot and Scottish Environment Protection Agency (SEPA).
- **Wales** – Cadw and Natural Resources Wales.
- **Northern Ireland** – DAERA.
- **Republic of Ireland** – Environmental Protection Agency.

In addition, the Scoping Report will be issued to the members of the Environmental Working Group currently advising the development of the SSEP and other relevant organisations identified by NESO.

Consultees are invited to comment on the content of this Scoping Report, in particular the evidence base for the SEA, the identified key issues and the proposed SEA framework.

Consultation with the public on the Environmental Report will subsequently take place alongside the publication of the draft SSEP in Quarter 2 of 2026.

In line with SEA requirements, the purpose of this Scoping Report is to gain consultation bodies'feedback on the proposed scope of the SEA for the SSEP; it is not intended to be a public consultation document.

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