



Cotswolds National Landscape Climate Change Strategy

Adopted February 2022

Introduction

Climate change is happening, and its impacts are unavoidable. We are already experiencing the dangerous impacts of a rapidly heating climate. Even if we cut emissions to zero tomorrow, further warming is inevitable due to the legacy of greenhouse gases in the atmosphere that will take decades to decline to safe levels.

Global and UK average temperatures have increased by around 1.2°C since the 1850 – 1900 period. The 2018 Climate change projections for the UK are broadly consistent with the UK Climate Projection 2009 (UKCP09)¹ showing a change towards warmer, wetter winters and hotter, drier summers and an increasing frequency and intensity of extreme weather events which will continue to amplify as climate change intensifies.

Action was urgent in 2009 but we have lost another decade making action even more urgent now requiring a deep and collective response.

The Cotswolds Area of Outstanding Natural Beauty (AONB) was designated in 1966 and extended in area in 1990. AONBs are landscapes whose distinctive character and natural beauty are so outstanding that it is in the nation's interest to safeguard them. The statutory purpose of AONB designation is to conserve and enhance their natural beauty. Each AONB is designated by reason of its special qualities; those aspects of the area's natural beauty which make the area distinctive, and which are valuable, especially at a national scale. They are the key attributes on which the priorities for its conservation and enhancement are based. These include flora, fauna, historical and cultural associations as well as landscape and scenic views. For further information see Appendix 1.

Cotswolds National Landscape is the new name for the Cotswolds AONB. The new name takes forward one of the proposals of the Government-commissioned 'Landscapes Review' to rename AONBs as 'National Landscapes'. This change reflects the national importance of AONBs and the fact that they are safeguarded, in the national interest, for nature, people, business and culture. Throughout this strategy the name Cotswolds National Landscape (CNL) and Cotswolds National Landscape (CNL) Board is used unless referring to documents that use Cotswolds AONB or the AONB designation.

Many of the defining characteristics and Special Qualities of the Cotswolds National Landscape are threatened by climate change and potentially our responses to it. Action is urgent, but needs to be well thought out and carefully implemented. Improving carbon literacy and understanding of the Cotswold landscape will help ensure the Cotswolds National landscape remains both beautiful and resilient into the future.

Farming needs to change to improve soils to continue producing food, reduce soil loss, sequester carbon and help with improving water quality and flood management; tree cover needs to increase to contribute to national woodland creation targets to capture carbon and support nature recovery; to reduce emissions by 80%, much more of our energy needs will have to be met through low carbon energy technologies, buildings need to become energy efficient and infrastructure needs to be more resilient. The Cotswolds National Landscape is not immune or exempt from playing a full part, but all this can be and should be done in ways that conserve and enhance the Cotswolds for future generations.

¹ <https://www.metoffice.gov.uk/research/approach/collaboration/ukcp>

Climate Change Strategy

The Cotswolds AONB Management Plan 2008 – 2013 contained policies on climate change mitigation and adaptation and to promote understanding of the impacts of climate change on the AONB. The latter, supported by UKCP09 climate change projections, led to the adoption of a Climate Change Strategy for the Cotswolds AONB in 2012. The 2012 Climate Change Strategy informed policies in subsequent Cotswolds AONB Management Plans, the development or revision of position statements and guidance including the review of the Landscape Strategy and Guidelines adopted in 2016.

This Climate Change Strategy is a review and updating of the 2012 Strategy based on the UKCP18 figures, Government policy and targets and the recommendations of the Landscapes Review. The strategy is for the whole of the Cotswolds National Landscape. This is a single ecological and cultural landscape with similar soils and farming and land management challenges that could be otherwise divided by up to 15 separate climate change strategies or plans based on local authority areas.

The purpose of the revised strategy is to better inform the CNL Board and stakeholders of the likely impacts of climate change on the Cotswolds. The Strategy seeks to take a landscape led approach, identifying actions to help decision makers, farmers, landowners, communities and businesses to respond to climate change and make the Cotswolds more resilient in ways that are compatible with and, ideally, make a positive contribution to the statutory purpose of AONB designation

The Strategy is at a high level and more detailed information and guidance on some themes is provided in CNL Board position statements and guidance and design and guidance produced by local planning authorities and bodies such as Historic England.

The intended timescale of the strategy is 10 years, although updated figures from the UK Climate Projections and changes in Government policy may require an earlier review.

Actions to tackle climate change and its impacts are in two groups:

Mitigation – actions that limit the rate and magnitude of climate change and its related effects by preventing and reducing emissions of CO₂ and other greenhouse gases and enhancing capture and storage of greenhouse gases.

Adaptation – the process of adjustment to actual or expected changes in climate and its related effects to moderate harm and exploit beneficial opportunities.

This Strategy sets out actions for both mitigation and adaptation

Background

Climate Change Act

The Climate Change Act 2008 sets a legally binding target to reduce greenhouse gas emissions to net Zero by 2050. To achieve this, the Climate Change Committee recommendation to government is that this requires a 78% reduction in UK emissions by 2035². This in turn requires:

- By early 2030s all new cars and vans and all heating boiler replacements are low-carbon, and all trucks are low carbon by 2040.
- UK electricity production is zero carbon by 2035 with offshore wind becoming the backbone.
- Low carbon hydrogen scales up by 2050 as a fuel for shipping, transport and industry.

² <https://www.theccc.org.uk/publication/sixth-carbon-budget/>

- UK wastes fewer resources and reduces reliance on high carbon goods.
- There is reduced consumption of high-carbon meat and dairy of 20% by 2030.
- Agriculture and use of farmland is transformed whilst maintaining the same levels of food per head of population as produced today.
- By 2035 460,000ha of new mixed woodland is planted to remove CO₂ and 260,000ha farmland shifts to energy crops. Woodland rises from 13% of the UK land area today to 15% by 2035 and 18% by 2050.

The Environment Act 2021

The Environment Act 2021 provides the Government with powers to set legally binding long-term targets for air quality, water, biodiversity, resource efficiency, waste reduction, fine particulates and species abundance. The Act also establishes the Office for Environmental Protection to advise and hold the Government and other public bodies to account. Many of the provisions have yet to be developed and targets set.

The Paris Agreement and COP26

The Paris agreement to limit global warming to well below 2 °C, preferably 1.5 °C, was adopted at COP³21 in Paris on 12th December 2016.

COP 26, held in Glasgow in November 2021, agreed the Glasgow Pact which recognises the severity of climate change impacts above 1.5 °C, strengthens the focus on limiting global temperature rise to 1.5 °C and recognises the need for accelerated emissions reduction during the 2020s by scaling up clean power and energy efficiency, and to ‘phase down’ coal power generation and to phase out fossil fuel subsidies. There were also agreements to halt and reverse deforestation, reduce methane emissions, ensure all new cars and vans are zero emission by 2040, provide finance for mitigation and adaptation and develop low carbon steel and concrete.⁴

The Colchester Declaration

In 2019 all AONB Partnerships and Conservation Boards adopted the Colchester Declaration⁵, a commitment to increase the scale and pace of nature recovery in AONBs in response to climate change. The Colchester Declaration states *that Climate change is the biggest threat to humanity and one of the greatest threats to biodiversity. Designated landscapes offer some of the most powerful solutions to the challenges of climate change and commits to ensure all AONB Management plans include meaningful measures around climate change mitigation and adaptation, including clear, measurable targets to support Net Zero.*

³ Conference of Parties (COP), the supreme decision making body of the 197 states that are parties to the United Nations Framework Convention on Climate Change.

⁴ <https://www.theccc.org.uk/publication/cop26-key-outcomes-and-next-steps-for-the-uk/>

⁵ <https://landscapesforlife.org.uk/projects/colchester-declaration>

Landscapes review

As part of the Government's 25 year environment plan⁶, the government commissioned an independent review of the AONBs and National Parks in England. The Landscapes Review⁷ reported in 2019 and stated that *'Our National Landscapes should be at the forefront of our national response to climate change. The government has committed to net-zero carbon emissions by 2050. The quarter of England which is covered by national landscapes will need to respond if this is to happen'*.

Climate Crisis commitment

The CNL Board adopted a Climate Crisis Commitment⁸ in October 2021. The commitment recognises the need to fulfil the Board's purposes in light of the likelihood of significant impacts of climate change on farming, soil health and biodiversity; that it is unrealistic to argue for no or little change and that the Board should lead on shaping the extent and nature of the CNL's contribution to mitigation in ways most compatible with AONB and Board objectives.

The commitment recognises the need to significantly increase the carbon literacy of the Board and its partners and stakeholders. To do this the CNL Board is to establish a baseline by calculating current emissions and carbon capture sequestration, evaluate potential emission reduction and increases in carbon sequestration, and model different combinations of options.

Nature Based Solutions

Nature-Based Solutions (NBS) to address the climate and biodiversity crises are an important element of an overall strategy, as they can be low-risk and cost-effective while providing simultaneous benefits to society. The International Union for the Conservation of Nature (IUCN) defines Nature Based Solutions as:

actions addressing key societal challenges through the protection, sustainable management and restoration of both natural and modified ecosystems, benefiting both biodiversity and human well-being. NBS have significant, but currently underutilised potential to help address global challenges such as climate change, human health, food and water security, natural disasters and biodiversity loss. If delivered appropriately, NBS can significantly contribute to addressing multiple societal challenges. For example, NBS have the potential to supply up to 37% of our climate change mitigation need. They can also reduce the negative effects of the climate crisis on people and nature by decreasing the impact of disasters and providing resilience to communities⁹

However, while NBS can incorporate a wide variety of different interventions there is potential for perverse and unintended outcomes if not implemented properly. As such, it is important that NBS in the Cotswolds National Landscape adhere to the following principles:

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf

⁷

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/833726/landscapes-review-final-report.pdf

⁸ <https://www.cotswoldsaonb.org.uk/wp-content/uploads/2021/11/CNL-Climate-Change-Commitment-11-2021.pdf>

⁹ IUCN: <https://www.iucn.org/resources/issues-briefs/ensuring-effective-nature-based-solutions>

- NBS can play a vitally important role in helping us to mitigate and adapt to climate change, but they are not a substitute for a rapid fossil fuel phase-out and must not delay urgent action to decarbonise our economy, locally and nationally.
- NBS should involve the protection and/or restoration of a wide range of ecosystems. Woodlands are one of the best habitats for sequestering carbon, but other ecosystems are also rich in carbon and biodiversity and support the livelihoods of local people. It is essential to prevent inappropriate tree-planting or natural regeneration on naturally open ecosystems that have high-biodiversity value such as species-rich grasslands.
- While commercial forestry is needed, large-scale tree-planting with, non-native species or low diversity plantations should not be considered an NBS. Compared to mixed species natural forests, low diversity plantations typically have lower biodiversity value, and are more susceptible to pests, diseases, fire and climate extremes.
- Protecting and restoring existing habitats is one of the most cost-effective ways of delivering NBS.
- NBS should ideally be implemented with full engagement and consent of local communities, with robust social safeguards, and should be designed to build human capacity to adapt to climate change. Landowners may need support with the consultation.
- NBS interventions should not be a substitute for more general and widespread efforts to sustain, enhance or support biodiversity.
- Biodiversity plays a vital role in the healthy functioning and resilience of ecosystems. It secures the flow of essential services, reduces trade-offs among them (e.g., between carbon storage and water supply) and builds human capacity to adapt to climate change in urban and rural areas.

Themes

The strategy is built on 12 themes, many of which clearly interlink such as biodiversity, woodland and landscape. There are also significant differences between the themes based on economic, grant and policy structures and the need for clarity of climate change impacts, impacts on the purposes of AONB designation resulting and strategies that led to the structure of the document. The 12 themes are:

1. Landscape
2. Soils and water
3. Farming
4. Biodiversity
5. Woodland and Trees
6. Historic and Cultural Environment
7. Buildings and new development
8. Transport
9. Energy
10. The Cotswold Economy
11. Tourism, Recreation and Access
12. Health and Wellbeing

Landscape

The European Landscape Convention (ELC)¹⁰ definition of “landscape” is: “ an area, as perceived by people, whose character is the result of the action and interaction of natural and / or human factors.”

Landscapes vary because of factors such as their underlying geology, soils, topography, land cover, hydrology, historic and cultural development and climate. The combination of characteristics arising from these physical and socio-economic influences, and their often complex interrelationships, makes one landscape different from another.¹¹

The Cotswolds are the most prominent and best known part of the band of Oolitic limestone that arcs across England from Dorset to the North Sea. The dominant landform is a steep west-facing escarpment behind which lies the high wold and a long, rolling dip-slope dissected by a series of river valley systems some of which are deeply incised.

The Cotswolds AONB Landscape Character Assessment (LCA)¹² identifies 19 different landscape types. Whilst this indicates a great variety of landform and land cover, the Cotswold landscape has nevertheless a strong fundamental unity. Each of the 19 Landscape Types has a list of identified Key Elements. A number of those elements occur across several landscape types and have been combined into 8 principal landscape elements that occur across the area, and which, either singly or in combination, contribute to the unique character and quality of the Cotswold landscape. These principal elements are:

- Drystone walls
- Ancient semi-natural woodland and veteran trees
- Permanent pasture including unimproved calcareous grassland
- Archaeological sites and their settings, and remnant historic landscapes
- Vernacular stone buildings and their settings
- Settlement patterns and their relationship to landscape
- Parkland and historic designed landscapes
- Hedges

The Cotswold landscape has evolved over time as a consequence of economic, social and policy drivers, and will continue to evolve. Climate change and our response to climate change and the ecological emergency will be a significant driver of change in the coming years and decades. The management of change is essential to conserve and enhance the special qualities for which the Cotswolds is designated as a National Landscape whilst increasing their resilience and to achieve sustainable economic, social and environmental outcomes.

Landscape character assessment is one of the most important tools for managing and guiding change. It informs understanding of key characteristics, sense of place, special qualities etc. that can then inform judgements – decision making - regarding, for example, development management and

¹⁰ <http://publications.naturalengland.org.uk/publication/6361194094919680?category=31019>

¹¹

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/691184/landscape-character-assessment.pdf

¹² <https://www.cotswoldsaonb.org.uk/our-landscape/landscape-character-assessment/>

the siting, design, scale and massing of developments from housing schemes and transport infrastructure to forests, woodlands, or renewable energy projects¹³.

Based on the Cotswolds AONB Landscape Character Assessment¹⁴ the Cotswolds AONB Landscape Strategy & Guidelines (LS&G)¹⁵ provides a practical tool to manage change in a sustainable and positive way by identifying forces for change and their implications for landscape character and develops strategies and guidelines to inform decision making. This ensures that change and development respects landscape character and that key features are conserved and enhanced.

Impacts of climate change on landscape

Collectively the impacts of climate change on the Cotswold landscape are expected to be considerable.

Responding to climate change is urgent but needs proper consideration to avoid well-intentioned interventions being ultimately harmful to the Cotswold landscape and the economy that depends upon it.

Farming will remain the principal land use. It will need to move to a system of Regenerative Agriculture. This includes a return towards less intensive mixed farming with increased use of short-term herb rich leys, cover crops and different models of low intensity grazing systems. Cropping patterns and timing are expected to change.

Drier warmer summers would lead at times to a 'droughty', parched landscape of bleached grassland, 'thin' arable crops and wilting trees and hedges.

Woodland and tree cover will increase due to a combination of the Cotswolds contribution to national woodland cover targets to achieve carbon Net Zero by 2050 and increased shelter for livestock and crops, including agroforestry and silvopasture systems. The area of grassland, wetland and scrub will increase to deliver habitat creation targets and Natural Flood Management schemes.

The range of tree species will change. This will include the loss of ash to Ash Dieback Disease and the potential loss of beech on the thinner soils and on exposed sites. Hedges, parkland trees and veteran trees are likely to be lost through more frequent drought conditions and extreme weather events.

The transition to low carbon energy will see demand for solar arrays, wind turbines and other technologies. The appearance of settlements will change due to the construction of low carbon housing leading to changes in orientation and design and retrofitting of vernacular buildings.

Woodland may benefit due to an increase in management stimulated by demand for biomass for energy.

Aim

Manage the impact of climate change and the Cotswolds contribution to national climate change targets to ensure consistency with conserving and enhancing the landscape character and scenic quality of the Cotswolds National Landscape.

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/691184/landscape-character-assessment.pdf

¹⁴ <https://www.cotswoldsaonb.org.uk/our-landscape/landscape-character-assessment/>

¹⁵ <https://www.cotswoldsaonb.org.uk/our-landscape/landscape-strategy-guidelines/>

Strategy

	Strategy	Stakeholders
L1	Continue to develop understanding of the landscape, its natural and cultural capital and ecosystem services and the impact of climate change	CNL Board, LNPs, local authorities, Defra, CPRE, universities, NFU, CLA
L2	Improve understanding of the landscape changes likely to result from climate change and national and local policies and actions to mitigate and adapt	Local authorities, CNL Board, communities/residents (including in neighbouring areas), CPRE, universities, Cotswold Voluntary Wardens, schools, youth groups, DMOs, businesses dependent on the landscape, NE, FC, EA, and visitors.
L3	Engage communities in the conservation and enhancement of the Cotswolds and development of the future Cotswold Landscape	CNL Board, local authorities, town and parish councils
L4	Develop guidance to help farmers and land managers adapt to climate change and conserve and enhance the special qualities of the Cotswold landscape. Identify examples of good practice	CNL Board, FC, FarmEd, GREAT ¹⁶ , agricultural universities and colleges, NFU, CLA
L5	Seek to ensure landscape, landscape character and the special qualities of the Cotswolds are part of the decision-making process and are taken into account within Climate Change Strategies, Local Nature Recovery Strategies, Woodland Strategies etc	Local authorities, NE, FC, EA, LNPs, LEPs, town and parish Councils, CNL Board
L6	Ensure decisions involving landcover change (especially tree planting) take account of how historic pattern of locations, scale and other key characteristics have shaped landscape.	CNL Board, local authorities, FC, NE, EA, Historic England

¹⁶ Gloucestershire Regenerative Environment and Agriculture Transition (GREAT) project

Soils and water

Cotswold soils are predominantly thin and brashy (stony), due in part to the move away from mixed farming to arable intensification over the past 60-70 years, making them prone to drying out. Deeper alluvial and more clay-rich soils are largely restricted to valley bottoms and dip-slope lowlands and are less well drained and consequently less prone to drought. Much of the Cotswolds is Grade 3 Agricultural land with small areas of Grade 2¹⁷.

A move away from mixed farming to continuous arable cropping across much of the Cotswolds over the past 60 or so years has led to poor soil structure, depleted soil organic content, soil erosion and reduced infiltration rates. Diffuse pollution from farmland, particularly phosphates bound to silts, has caused issues with water quality in most Cotswold rivers. Soils under permanent pasture can become compacted causing pans, restricting root penetration, reducing water infiltration and increasing run-off

The understanding of the need for good soil management has greatly increased over the past 20 years. Many farms have moved to min or no-till methods of cultivation improving soil structure, infiltration and organic content. The latter also increases carbon sequestration. However, not all crop and soil types can be managed by min or no-till and the cost of investing in new equipment can be a barrier. Cover crops, rotational leys, including herb-rich leys and mob grazing¹⁸ are increasingly being adopted as part of a shift towards Regenerative Farming (see appendix 1).

Increasing soil organic content by 0.1% can increase carbon sequestration by 8.9t per hectare and herb-rich pastures are capable of sequestering up to 20t ha⁻¹ per year¹⁹.

The recent average annual rainfall for the Cotswolds National Landscape has been 800mm. Local recording has shown significant increases. Between 1986 and 2021 annual rainfall in Old Sodbury has increased from 800mm to 950 – 1000mm, mainly due to more intense rainfall²⁰. Most of the Cotswolds drain south-east through the river systems and the limestone aquifer. Most Cotswold rivers are tributaries of the Thames, but the River Avon and river systems in the south of the CNL around Bath drain into the Severn Estuary along with the smaller streams running down the scarp such as the Chelt and Isbourne.

The Cotswolds are an important source of good quality water both from surface water and boreholes into the limestone aquifer, mostly supplied to areas outside the CNL. Because of this 'downstream' demand, Catchment Abstraction Licencing Strategies class most of the Cotswolds as 'restricted water availability'.

There are significant issues with phosphate and sediment levels in many watercourses and nitrates in ground water supplies. On the basis it is more cost effective to work with farmers to prevent diffuse pollution than it is to remove contaminants at water treatment works Thames Water have recently been working with farmers along the Evenlode to reduce silt and nutrient input and have supported a move away from metaldehyde slug pellets. In October 2021 the Thames Water Smarter

¹⁷ <https://magic.defra.gov.uk/http://publications.naturalengland.org.uk/publication/144017?category=5954148537204736>

¹⁸ **Mob grazing** is short duration (1-3 days), high density grazing with a longer than usual paddock recovery period, boosting pasture resilience, sward recovery and improved soil structure.

¹⁹ <https://www.farmcarbontoolkit.org.uk/resources/articles/building-carbon-farm-soils>

²⁰ R & P Wilson, January 2022

Water Catchments programme launched in the Evenlode catchment²¹ to deliver a step change in holistic catchment management.

Several Cotswold rivers, particularly the Windrush, have issues with raw sewage being released from sewage treatment works (STWs) during heavy rainfall events. Such releases are often permitted by the EA but are mostly illegal. In 2020, Thames Water reported spilling untreated sewage for 3,644 hours on 228 occasions from 4 of the sewage works on the River Windrush²². This is due to a capacity issue with STWs no longer able to cope with increasing population size and water ingress into the wastewater system particularly during wet weather events. The Environment Act 2021 includes provisions to ensure water companies secure a progressive reduction in the adverse impacts of discharges from storm overflows.²³

Approximately 5% of rural properties have septic tanks or cesspits, some of which fail due to age or poor maintenance and contribute an estimated 2.3% of phosphate input to rivers²⁴.

Agriculture and rural land management accounts for an estimated 50 – 60% of nitrate losses to water, 75% of pesticides and 20 – 30% of phosphorous, mostly in the form of diffuse pollution. Significant sources of pollution from farming comes from poorly constructed slurry and silage stores. The equine sector is also of concern with pollution from manure storage, washing down areas and run off from yards²⁵.

A significant number of communities in the Cotswolds experience damaging flooding during heavy rainfall events²⁶. Waterflow from rivers and groundwater from the Cotswolds contribute to downstream flooding, particularly in the Thames and Severn Vale catchments. To reduce flooding, several Natural Flood Management Projects are working across the Cotswolds using interventions such as leaky dams, deflectors, bunds and tree planting. Min or no-till farming increases infiltration and water retention in arable soils but soil compaction is prevalent on many permanent agriculture pastures, a problem that still needs tackling.

Predicted impacts of climate change.

Soils: with a predicted 22% decrease in summer rainfall by 2080, the free draining Cotswold soils, particularly the thin brash, will become more prone to drought. Extreme weather events and a predicted 22% overall increase in winter rainfall could lead to flooding, poaching of soils, soil loss and silt and nutrients being carried into watercourses. These combined impacts would lead to soil damage, erosion events, siltation of rivers, nutrient loss and water quality failure. Soil management practices to mitigate these impacts will become increasingly important.

Water: some stretches of Cotswold rivers are already prone to low flows, resulting in damage to riverine habitat, concentration of pollutants and less water available for abstraction. With summers predicted to become drier, this problem will be exacerbated further reducing the amount of water available from boreholes in the limestone aquifer. The incidence of algal blooms and eutrophication is likely to increase.

²¹ <https://www.thameswater.co.uk/about-us/responsibility/smarter-water-catchments>

²² <https://www.windrushwasp.org/sewage-pollution>

²³ <https://www.legislation.gov.uk/ukpga/2021/30/section/80/enacted>

²⁴ https://consult.environment-agency.gov.uk/++preview++/environment-and-business/challenges-and-choices/user_uploads/agricultural-and-rural-land-management-challenge-rbmp-2021.pdf

²⁵ https://consult.environment-agency.gov.uk/++preview++/environment-and-business/challenges-and-choices/user_uploads/agricultural-and-rural-land-management-challenge-rbmp-2021.pdf

²⁶ <https://flood-map-for-planning.service.gov.uk/>

Conversely, the risk of flooding is likely to increase in winter months and following extreme weather events. There will be an increased demand for flood water capture and storage, for erosion control, and for flood management and defence schemes.

Non-native invasive species may become an increasing problem in the aquatic environment.

Aim

The management of soils continues in order to improve to mitigate the impacts of climate change, improve water quality and sustain food production.

Water flows are managed to reduce low flows and flooding within and downstream of the Cotswolds

Strategy

	Strategy	Stakeholders
SW1	<p>Manage soils to increase organic content, sequester carbon and increase resilience to drought and erosion including use of:</p> <ul style="list-style-type: none"> • Cover crops • Intercropping • Reintroduction of rotations. • Extended rotations • Min and no-till • Decompaction <p>Promote adoption of Regenerative Agriculture principles</p>	<p>NE (CSF²⁷), EA, Farmers and occupiers, landowners/managers, agricultural and horticultural colleges</p> <p>Sustainable Farming Incentive (SFI) Farm Investment Fund</p>
SW2	<p>Protect water courses from siltation and nutrient enrichment from run-off e.g.</p> <ul style="list-style-type: none"> • Buffer strips alongside water courses and gateways • Improving slurry and silage stores • Prevent run-off from yards and tracks • Cross drains on farm tracks • Contour cultivation. • Preventing compaction • Woodland creation for water quality 	<p>NE, CSF, FC, EA, water companies, Defra Farmers and land managers, local authorities.</p>
SW3	<p>Seek opportunities to re-connect rivers with their floodplain and create wetlands</p>	<p>EA, catchment partnerships, farm cluster groups, NE</p>
SW4	<p>Ensure that other benefits of more sustainable soil management – notably for archaeological monuments in arable and net gains in</p>	<p>Defra, NE, EA, Historic England, catchment partnerships, CLA, NFU</p>

²⁷ Catchment Sensitive Farming

	biodiversity are maximized, especially for designated sites and areas	
SW5	Upgrade Sewage Treatment Works to cope with growing populations and wet weather events to <ul style="list-style-type: none"> • Improve effluent quality • Prevent raw sewage releases due to storming 	Water companies, EA, Government.
SW6	Ensure domestic and private wastewater treatment units are performing to the required standards	EA, property and business owners
SW7	Promote and support Natural Flood Management in line with the CNL Landscape Strategy & Guidelines	EA, NE, FC, wildlife trusts, local authorities, catchment partnerships, local flood groups, farmers and land managers.
SW8	Appropriately assess flood risk, taking into account climate change projections and implement sustainable flood risk management	EA, local authorities, catchment partnerships
SW9	Avoid low flows due to water abstraction.	EA licencing, water companies
SW10	Encourage and provide information and guidance on rainwater storage and sustainable irrigation systems that are consistent with AONB and CNL Board objectives	Local authorities, NFU, CLA, NE (CSF) rural businesses,
SW11	encourage the management of water flows using Sustainable Management Systems (SuDs).	Local authorities, EA
SW12	Encourage and support reduction in water consumption through encouraging water efficiency measures, grey water recycling, rainwater harvesting.	Water companies, local authorities, NFU, CLA, LEPs, property owners and managers

Farming

Changes in farming and in land use are one of the principal drivers of change in the Cotswold landscape. The predicted impacts of climate change on farming and Climate Change Committee recommendations for changes in land use will accelerate change and have a major impact on the landscape, on biodiversity and on the economy of the Cotswolds including tourism.

The CNL is a farmed landscape and its landscape largely a product of farming. The special qualities of the Cotswolds National Landscape include ‘the high wolds - a large open, elevated predominantly arable landscape with commons, ‘big skies and long distance views’, ‘flower rich grasslands, particularly limestone grasslands’ and ‘distinctive dry stone walls’.

Farming is worth around £800 million annually to the CNL economy and in turn provides the landscape which supports the Cotswolds tourism industry annually worth around £1 billion.

87% of land in the CNL is agricultural land, 49% of which is arable and 43% grassland²⁸. The main crops grown are winter wheat, spring barley and oilseed rape although the area of the latter has dropped significantly due to the ban on the use of neonicotinoids in 2018.

With the exception of some small areas of grade 2 land, the CNL agricultural land is classed mostly as grade 3 (good to moderate) with areas of grade 4 (poor quality) primarily due to limitations of the thin stony soils and areas of steep gradient²⁹ affecting the choice of crops and methods of cultivation. Steep gradients often prohibit cultivation and limits farming to livestock.

Farming produces around 10% of the UK’s Greenhouse Gas (GHG) emissions though is different from other sectors in that only 10% is CO₂ but 40% is Nitrous oxide and 50% methane³⁰. The latter two are significantly more potent greenhouse gases than CO₂. Whilst GHG emissions are inherent in food production due to biological processes and chemical interactions in both livestock and plant growth, it is important that emissions are reduced by making more efficient use of fertilisers, improving soil husbandry, optimising land management and land use, modifying livestock diets, improving storage and use of manures and slurry, turning waste into resources and taking advantage of advances in technology.

In response many farmers are considering moving towards Regenerative Agriculture (see Appendix 2) rather than intensive farming practices. This system includes reducing the use of chemicals, increasing the use of organic matter from herb-rich leys³¹ and cover crops and increasing stock density but for shorter periods to retain more leaf area etc. There is also growing interest in Agroforestry where trees are grown along with crops to provide tree products (fruit, forage etc) and protection for soils, crops and livestock.

The Government has put in place a new Agriculture Act and Agriculture Transition Plan which includes the phasing out by 2027 of the Basic Payment Scheme (BPS) whereby agriculture was supported by payments based on area of land. In future farmers and land managers will be able to apply to join the Environmental Land Management scheme (ELMs) and receive ‘payments for public goods’ - from 2024 or earlier if they have a pilot agreement. The financial impact on farm businesses

²⁸ <https://www.cotswoldsaonb.org.uk/wp-content/uploads/2017/11/farming-forestry-and-the-equine-sector-in-the-cotswolds-aonb-november-2015.pdf>

²⁹ <https://magic.defra.gov.uk/>

³⁰ <https://www.nfuonline.com/nfu-online/business/regulation/achieving-net-zero-farmings-2040-goal/>

³¹ Herb-rich leys include nitrogen fixers such as lucerne and deep rooted species which improve infiltration.

in the Cotswolds from the phasing out of the BPS will be significant, driving the search for diversification and changes in land-use or intensification.

The Sustainable Farming Incentive, part of the ELMs, is due to launch in 2022 and will pay farmers to manage their land in an environmentally sustainable way through a series of Standards based on management of soils, grassland, field margins, hedgerows etc

Predicted Climate Change impacts on farming

Grass yields and some crop yields are likely to increase due to an extended growing season, but with a greater variability in quantity and quality. There is increasing risk of crop failure due to drought, particularly on the thin, brash soils. Crops which currently are climatically not suited to the Cotswolds may become more viable. Changing weather patterns and extreme weather events are likely to impact on cultivation and sowing dates, harvesting, germination success and cause physical damage to crops. In response new and more resilient crop varieties including GM (subject to debate and decision about this controversial issue) and novel crops are likely to be adopted along with agroforestry. Different breeds of sheep and cattle may be introduced which are better suited to warmer drier conditions.

Regenerative or agro-ecological agriculture increasingly becomes the norm. The area of cereal and oilseed crops will reduce as land is used for temporary leys to conserve and build soils as part of the arable rotation. There is also a risk that some areas of permanent pasture could be brought into the cropping cycle destroying a valuable carbon sink and releasing carbon into the atmosphere. Minimal and no-till systems will continue to expand where soils and crop types allow. Some land will be taken out of farming to help achieve national woodland creation targets and low carbon energy production.

Fruit and vegetable growing will increase due to the growth of box schemes, Community Supported Agriculture and the use of fruit and nut trees in agroforestry.

Integrated Pest Management is already widely practised but different types of pests and disease are expected.

The trend in reducing overall livestock numbers is expected to continue but the area of land grazed will increase as part of the move to a system of more mixed arable/livestock rotations and for priority habitat creation to achieve nature recovery targets. The result will be a shift to a mixture of mob-grazing techniques³² and low intensity, extensive grazing.

Longer term farm business planning and diversification to spread risk will have increasing emphasis as will farm co-operation and collaboration to deliver benefits at a landscape scale.

Aim

Farming adapts to climate change, moves towards net zero by 2040, produces quality food whilst managing land in a more environmentally sensitive way delivering wider public benefits, is economically viable and maintains the special qualities of the CNL landscape.

³² **Mob grazing** is short duration (1-3 days), high density grazing with a longer than usual paddock recovery period, boosting pasture resilience, sward recovery and improved soil structure. It can also help break the parasite cycle

Strategy

	Strategy	Stakeholders
F1	Encourage and support farmers and land managers to adopt farming and land management practices that adapt to and mitigate the impacts of climate change whilst still being productive and viable e.g., Regenerative Farming, improved use and storage of manures and slurries and min/no-till	Landowners, farmers, NFU, CLA, NE, EA, FC, FarmEd, universities and colleges, Soil Association
F2	Encourage and support the farming sector understand to reduce Greenhouse Gas emissions Increase the awareness of the benefits and practicalities of cost-effective climate mitigation measures Support and encourage the use of farm carbon calculators	NFU, CLA, Defra, universities and colleges, NE, EA, FarmEd, RAU, Soil Association.
F3	Support carbon-offsetting financial instruments which reward farmers for sequestering carbon while also enhancing the landscape	Defra, LNPs, Wild Carbon Trust, private sector
F4	Promote and support the uptake of Countryside Stewardship and ELMs and supporting grant schemes such as Farming in Protected Landscapes, the Farming Incentive Fund, Farming Transformation Fund and England Woodland Creation Offer	Defra, ELMs delivery body, CNL Board, FWAG, FC, EA, NE, FarmEd
F5	Provide local guidance and support for ELM applicants to ensure local priorities ³³ are included and delivered	CNL Board, FWAG, wildlife trusts, land agents
F6	Ensure that other benefits of improved management – eg min till for archaeological sites; heritage potential of diversification that retains and enhances the historic farm buildings – are delivered as part of making farming more sustainable.	Defra, NE, EA, local authorities, NFU, CLA, Historic England
F7	Encourage and support the formation of Farm Clusters across the Cotswolds to deliver benefits at a landscape scale	CNL Board, FWAG, wildlife trusts, FarmEd
F8	Provide advice and guidance to farmers and land managers on mitigating the landscape impacts of adapting to climate change e.g., agroforestry	CNL Board, FarmEd, FWAG

³³ Local priorities will include CNL Management Plan priorities, LNRS and CNL Nature Recovery Plan, flood risk etc.

F9	<p>Localise production and supply of food and other agricultural products and increase demand for climate- and nature-friendly products.</p> <p>Seek to localise and shorten supply chains e.g. local abattoirs and processors.</p> <p>Promote Community Farming initiatives</p> <p>Encourage public procurement of local, climate-friendly food</p>	<p>Farm businesses, NFU, CLA, local communities, GREAT³⁴</p> <p>Crown Commercial Services, public authorities, Food for Life</p>
F10	<p>Monitor the impact of pests and diseases and promote management to minimise effects</p>	<p>Defra, FC, NE, AHVLA</p>
F11	<p>Promote forms of farming business diversification appropriate to the Cotswolds National Landscape</p>	<p>CNL Board, NFU, CLA, FC, local authorities, FarmEd</p>

³⁴ Gloucestershire Regenerative Environment and Agriculture Transition (GREAT) project
<https://www.fwagsw.org.uk/the-great-project>

Biodiversity

Much of the UK's wildlife-rich habitat has been lost over the last century and many species are in long-term decline. The CNL has, however, managed to partially retain and support a range of habitats and their dependent flora and fauna due largely to a combination of topography, traditional land management practices and legal protection. Currently, 23% (48,000ha) of the CNL is wildlife rich habitat. Many sites of importance for biodiversity are the remnants of semi-natural communities and depend on low-intensity land management practices. Arable is an important habitat in the Cotswolds for farmland birds and arable plants. The CNL contains five SACs, three NNRs, 89 SSSIs and a large number of Local Wildlife Sites.

Of particular significance in the Cotswolds are unimproved grasslands and meadows, ancient woodland, limestone streams and rivers, and open farmland. Many of these areas are under pressure or declining in value due to the scale and extent of change as a result of inappropriate management, fragmentation, changes in surrounding land use and management, and perceptions of low importance.

Projects such as Save our Magnificent Meadows, Glorious Cotswolds Grassland (GCG) and the Gloucestershire Wildlife Trust's Cotswolds Rivers Project have, working with farmers and land managers, conserved and extended priority habitats. GCG alone 'created' over 200ha of new wildflower rich grassland between 2019 and 2021.

Over the millennia, wildlife has adapted to climate change such as during the ice ages and interglacial warm periods as it had space to move across the landscape finding new geographical locations (e.g., by moving north, south or up-slope) that suit their requirements or niche. Nowadays, wildlife is starting from a considerably lower baseline, reduced abundance and faces much greater challenges of moving across a dramatically different landscape with little suitable habitat to move through and major barriers such as cities, motorways and intensive land-use.

Local Nature Recovery Strategies and Networks

Local Nature Recovery Strategies (LNRS) are statutory documents with spatial mapping to inform and agree priorities for nature recovery on the ground. LNRS map the most valuable sites and habitats for wildlife and identify where nature can be restored, for example, through creation of wetland and wildflower meadows. The aim is to link up habitats, restore nature and provide green space for communities.

The Government's 25 Year Environment Plan³⁵ published in January 2018 includes a commitment to "develop a Nature Recovery Network to protect and restore wildlife and provide opportunities to re-introduce species that we have lost from our countryside". The 25 Year Environment Plan has the national target to provide 500,000 ha of additional wildlife habitat

The Local Nature Recovery Network (NRN) are being developed to provide a detailed decision-making tool that identifies the best opportunities to deliver nature's recovery. The Nature Recovery Networks will underpin the LNRS.

³⁵ <https://www.gov.uk/government/publications/25-year-environment-plan>

The Colchester Declaration

In 2019 members of the National Association for AONBs signed the Colchester Declaration³⁶. The declaration, in response to many local authorities declaring a climate emergency and the Landscapes Review³⁷ which stated that all National Landscapes should be delivering more for nature, seeks to significantly increase the scale and pace of nature conservation activity in AONBs.

Cotswolds National Landscape Nature Recovery Plan

One of the targets of the Colchester declaration is for each AONB to prepare a Nature Recovery Plan. The CNL Board adopted the Cotswolds Nature Recovery Plan in October 2021. The Nature Recovery Plan is particularly important for the CNL which is otherwise split across six areas developing their own Nature Recovery Strategies and Nature Recovery Networks. See appendix 3 for the habitat targets to achieve by 2050 in the Cotswolds NRP³⁸.

To help deliver the Colchester Declaration AONB Partnerships and Boards are collaborating to develop large landscape scale nature recovery projects. The CNL is part of 'Big Chalk', a visionary scheme to build ecological resilience in and between calcareous landscapes running from the south coast to the midlands.

Nature recovery will be to a great extent, reliant on the new Environmental Land Management Scheme due to fully launch in 2024, mechanisms such as Biodiversity Net Gain³⁹ and private sector investment.

Ecological Emergency

An increasing number of local authorities are declaring an Ecological Emergency which puts ecological issues at the heart of the Authority's actions to deliver nature recovery across the authority's area. Some, such as Cotswold District Council have developed Ecological Emergency Action Plans⁴⁰.

Predicted climate change impacts on biodiversity

Climate change will lead to changes in temperature, water, soils, land management and land use. There are likely to be changes in the timing of seasonal events leading to a loss of synchrony between species and the resources that they depend on, notably for food and pollination⁴¹.

Extremes of drought and wet can lead to changes in plant and insect communities through loss and colonisation and expansion in range by more tolerant species.

³⁶ https://landscapesforlife.org.uk/application/files/7815/6326/2583/The_Colchester_Declaration.pdf

³⁷ Landscapes Review, final report, Defra 2019.
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/833726/landscapes-review-final-report.pdf

³⁸ <https://www.cotswoldsaonb.org.uk/looking-after/cotswolds-nature-recovery-plan/>

³⁹ . Biodiversity Net Gain is an approach to development that leaves biodiversity in a better state than before. Where a development has an impact on biodiversity it encourages developers to provide an increase in appropriate natural habitat and ecological features over and above that being affected <https://cieem.net/i-am/current-projects/biodiversity-net-gain/>

⁴⁰ <https://www.cotswold.gov.uk/>

⁴¹ <http://publications.naturalengland.org.uk/publication/5679197848862720>

Consequently, species in areas climatically suited to host particular species and suites of species are likely to migrate, leading to changes in the range and abundance of species, local extinctions and the establishment of species new to the Cotswolds including from the near continent.

Changes in the principal land uses of farming and forestry, such as the timing of cultivation and harvest, new crops and crop varieties, non-native tree species and energy crops (e.g., maize, miscanthus and short rotation coppice), could adversely affect some species. Conversely, some predicted changes in farming and forestry practice could be beneficial for indigenous species, such as through extensive grazing on the Cotswold grasslands.

There is a risk that the national tree planting target to achieve net zero by 2050 and for flood management could impact on open habitats such as grassland and arable directly by planting and/or by cutting off connections or potential connections.

Other potential impacts include an increased threat of wildfire. There is also an increased threat from a range of pests and diseases such as *Phytophthora ramorum* and chestnut bleeding canker in trees, as well as midge-borne diseases. New crops and non-native plants could increase the risk of introducing and supporting new pests and diseases. Invasive non-native species may become an increasing problem and some benign non-native species may become invasive due to changes in climate.

Aim

The impacts of climate change on biodiversity should be mitigated by managing, extending and linking priority habitats, and creating a permeable landscape.

Strategy

	Strategy	Stakeholders
B1	Work collaboratively to prevent any further loss of priority habitats and ensure existing habitat becomes more resilient by being well managed	NE, FC, Plantlife, Butterfly Conservation, wildlife trusts, local conservation groups, farmers, landowners, LNPs
B2	Extend, link and buffer existing priority habitat. Develop landscape scale projects such as Glorious Cotswolds Grassland and 'Big Chalk'. Ensure long-term management plans are in place	NE, FC, Plantlife, Butterfly Conservation, wildlife trusts, local conservation groups, farmers, landowners, LNPs and other members of the Cotswold Ecological Network Partnership, local planning authorities
B3	Ensure LNRS and the NRN link with and deliver the relevant outcomes of the Cotswolds AONB Management Plan and Nature Recovery Plan	Local authorities, LNPs, CS and ELM
B4	Promote the Cotswolds AONB Nature Recovery Plan Ensure connectivity across LNRS boundaries	CNL Board CNL Board, local authorities, LNPs
B5	Increase the understanding of the role of grasslands, wetlands and other non-	CNL Board, FWAG, wildlife trusts

	woodland habitats have in carbon capture and storage	
B6	<p>Work collaboratively to maximise the contribution of biodiversity net gain through development.</p> <p>Ensure the ecological impact of development is assessed and wider environmental benefits from nature maximized.</p>	Local authorities, CNL Board, LNPs, developers
B7	Avoid habitat creation impacting on existing habitat or reducing potential connectivity.	CNL Board, LNPs, local authorities, FC, NE, EA
B8	Ensure ELM delivers Cotswolds priority habitat and includes options and guidance to suit changing species and habitat needs and trends	NE, FC, Defra, water companies, EA
B9	Monitor the impact of climate change on priority habitats and species.	Wildlife trusts, NE, FC, EA, local volunteers, Wildflower Society, BSBI
B10	Monitor the impact of pests and diseases and promote management to minimise negative effects	Defra, FC, NE, AHVLA
B11	Monitor invasive non-native species and keep a watching brief on potential invasive species	Non Native Species Secretariat, Government, EA, NE, universities,

Woodland and Trees

Woodland covers around 14%⁴² of the Cotswolds National Landscape and the type, scale, location, and frequency is an important characteristic of the Cotswold landscape and an important element in defining landscape character. However, open, expansive landscapes and sparsity woodland and trees are also an important characteristic and Special Quality of the Cotswold landscape.

The most important woodlands are the ancient and semi-natural woodlands, many of which are designated as SSSIs. They consist largely of native broadleaves or Plantations on Ancient Woodland Sites (PAWS) and have a rich distinctive ground flora. Some of the most impressive are the beech-yew woods that lie along the escarpment between Dursley and Birdlip and the ash-maple-hazel woodlands around Bath.

Conifer plantations occur occasionally across the CNL, usually on the high wold and dip slope.

Trees outside of woodlands are important in the wider landscape as roadside trees, trees in fields, hedgerow trees and trees in parks, gardens and urban open space, often as trees that provide strong landscape features either singly or in small groups. Hedgerow trees, mature shelterbelts, streamside trees and trees lining watercourses are key characteristics of 15 out of the 19 Landscape Character Types described in the Cotswolds AONB Landscape Character Assessment.

The Government is committed to achieving net zero carbon emissions by 2050. To help achieve this the Government has a target to increase woodland cover in England from 10% to 12% by 2060 in the 25 Year Environment Plan and within its election manifesto to increase tree planting across the UK to 30,000 ha per year by 2025. The annual target for England is 10,000ha⁴³. The Cotswolds has a role in delivering these targets whilst conserving and enhancing the landscape and ensuring space for other habitats. Based on the England target, the Cotswolds has a target of 4,000ha of woodland creation

Trees and woodland planted in the right place can strengthen landscape character, create and link important habitat, contribute to flood management, capture and store carbon and help the Cotswold economy. Trees and woodland planted in the wrong place will be detrimental to the highly valued Cotswold landscape, impact on other priority habitats and species such as grasslands and farmland birds and block views and panoramas. Shelterbelts can be a particular problem in this respect.

Natural regeneration should be considered as a method of creating new woodland. In the right location, usually adjacent to an existing woodland, it can be a cost-effective method.

There are increasing concerns over the use of plastic tree guards and spirals to protect trees from pests and aid establishment. Non-plastic alternatives are becoming available but their effectiveness has yet to be fully proved. Others will no doubt become available in the near future. One major manufacturer of plastic tree guards has launched a recycling service. There is also a growing move to use deer and rabbit fencing for woodland creation, removing the need for individual tree protection.

Any proposal to create a woodland or plant trees needs to include resources for proper sustainable management over the following decades to maximise the intended benefits.

⁴² Official figure is 12.8% but excludes woodland <0.5ha, low-density woodland and recently planted woodland

⁴³

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/987432/england-trees-action-plan.pdf

61% of woodland in the Cotswolds is classed as in 'active management'⁴⁴. However, in reality, most woodland in the Cotswolds, including young plantations, is undermanaged or not managed, reducing resilience, biodiversity value and timber quality. This is supported by the Woodland Trust's figure that only 4% of Britain's woodlands are in 'good ecological condition'⁴⁵. The presence of ash dieback has led to a significant number of felling licence applications collectively covering a large area of woodland to be clear felled (60% - 100% felled) or regeneration felled (40% - 60% felled) with re-stocking.

A number of woodlands, particularly on the dip-slope and around Bath, were traditionally managed by coppicing providing materials for building, thatching, tool handles etc. Re-introducing coppicing can greatly benefit the woodland and biodiversity and provide products such as wood fuel, charcoal and stakes and binders for hedgelaying.

A major threat to woodland and trees are pests and diseases particularly non-natives that have become established in the UK. Other pests and diseases have become established on the near continent, including Emerald Ash Borer and Xylella and are a constant threat and are being monitored closely.

Ash dieback is present across the Cotswolds and could result in up to 95% of ash trees being lost over time. Ash is a predominant tree in the Cotswolds and the impact on landscape will be considerable.

Grey squirrels and deer cause considerable damage in woodlands and young plantations. Their populations continue to grow and will benefit greatly from increased woodland creation. To be effective grey squirrel and deer management needs to be at a landscape scale. Following a feasibility study Pine Marten has been re-introduced to the Forest of Dean, in part to see what the impact will be on the grey squirrel population⁴⁶.

Predicted climate change impacts on woodland and trees

Today's growing conditions are different from anything in the past and the rate of change may be up to 30 times faster than trees have ever managed to adapt to on their own⁴⁷.

Increased timber and biomass yield can be expected in the short to medium term due to a longer, warmer growing season. In the longer term more frequent drier summers will lead to drought stress and a reduction in growth rates and higher risk of secondary disease outbreaks and fire. Both a longer growing season and drought stress will lead to a reduction in timber quality. Increasing intensity of weather events, particularly wind, will lead to increased damage and risk of windthrow.

Woodland and tree cover will increase in response to climate change mitigation and carbon sequestration targets. This will range from new woodlands, scrub and trees as a mosaic with other habitats, hedgerow trees and agroforestry. Increasing woodland and tree cover will change the landscape of the Cotswolds and could be harmful if not well designed or located in the right places.

Species composition will also change as a wider variety of species, including non-native, are planted in new and existing woodlands and the wider landscape to increase resilience to climate change.

⁴⁴ Forestry Commission 2020

⁴⁵ <https://www.woodlandtrust.org.uk/media/49731/state-of-the-uks-woods-and-trees-2021-the-woodland-trust.pdf>

⁴⁶ Project Pine Marten <https://www.gloucestershirewildlifetrust.co.uk/project-pine-marten>

⁴⁷ John Weir, National Woodland Resilience Adviser, Forestry Commission

Some species, such as pedunculate oak, are expected to fare better than others. The Cotswolds are on the boundary between the southeast where beech is predicted to struggle, particularly on drought prone soils, and the north and west where is expected to thrive and its natural range expand⁴⁸. An increasing number of woodland creation proposals exclude beech on the basis of climate change and being prone to squirrel damage. Because the Cotswolds is on the cusp of beech failing and thriving, beech should still be included in woodland creation and restocking proposals where the soils are appropriate.

Establishment of new woodland will become more difficult, particularly on the thin, brash soils, due to increasing risk of drought conditions.

Changes in rotation length, stocking rates and forestry operations can be expected along with the use of different species and provenance. The current trend towards broadleaves is likely to continue. Markets for biomass/woodfuel are likely to increase.

Aim

Woodland and trees adapt to climate change and become an economically viable resource. The area of woodland and trees increases whilst maintaining the landscape character and special qualities of the CNL.

Strategy

	Strategy	Stakeholders
WT1	Extend the area of woodland actively and sustainably managed to increase resilience, optimize carbon sequestration and maximize benefits for biodiversity and people. Re-introduce coppice rotation, particularly in woodland with redundant coppice. Provide guidance on woodland management and assistance with management plans	NE, FC (via CS and ELM), Landowners, Farmers, NFU, CLA, Woodland Trust FC, NE, Small Woods Association, CNL Board FC, NE (via CS and ELM), agents/consultants, Woodland Trust
WT2	Provide information and guidance on tree planting and woodland creation ensuring the right tree in the right place for the right reason to conserve and enhance the landscape character and special qualities of the Cotswolds National Landscape, including historic patterns of woodland cover, designed planting, wood pasture etc., to enable trees and woodlands to play their part in ensuring the CNL is resilient to climate change.	CNL Board, FC, NE, Woodland Trust, Tree Council, local authorities, Woodland Trust, NFU, CLA, CPRE, universities, communities, land agents, woodland contractors
WT3	Explore and promote appropriate alternatives to traditional woodland	CNL Board, FC, FWAG, Woodland Trust

⁴⁸ <https://www.forestresearch.gov.uk/documents/942/fcin069.pdf>

	creation such as wood pasture and silvo-pasture.	
WT4	Woodland creation and restocking after felling should comprise ⅓ of trees from selected seed sources from the same Region of Provenance as the site to be planted (403 and 404 for the Cotswolds), ⅓ from the region to the south (404 and 305) and ⅓ from northern France to increase resilience to climate change as recommended by the Forestry Commission ⁴⁹ . Importing tree stock or seed should follow current biosecurity measures.	CNL Board, FC, NE, landowners, agents, nurseries
WT5	Support and encourage the restoration of conifer plantation, particularly PAWS, into broadleaf woodland	CNL Board, Woodland Trust, FC, wildlife trusts, Forest of Avon Trust.
WT6	Explore alternative forms of financial support for tree and woodland planting and sustainable management e.g., carbon offsetting, air and water quality.	FC, EA, Defra, farm cluster groups
WT7	Establish Deer Management Groups (DMGs) across the Cotswolds Monitor deer population and impacts	CNL Board, FC, landowners, Defra (ELM) FC, DMGs
WT8	Monitor the Pine Marten reintroduction into the Forest of Dean and impact on grey squirrel population and if successful assess the potential to re-introduce pine marten to the Cotswolds	FC, wildlife trusts, Woodland Trust
WT9	Promote the coordinated control of grey squirrel (link with DMGs above).	FC, landowners, Defra (ELM)
WT10	Monitor the spread of pests and diseases that could impact on the Cotswolds, including those not yet present in the UK and promote action plans to eradicate the pest/disease or minimise effects.	Forest Research, FC, Defra, FC, NE, Animal and Plant Health Agency (AHPA)
W11	Monitor the spread of feral boar populations in the Forest of Dean and Southeast (currently absent from the Cotswolds) and if there is evidence of them in the Cotswolds, assess impact and take any necessary action.	FC

⁴⁹ CCB 2017, Woodland creation and tree planting in the Cotswolds AONB – Tree species and provenance. <https://www.cotswoldsaonb.org.uk/wp-content/uploads/2017/07/Position-Statement-on-Tree-Species-and-Provenance-June-2017.pdf>

WT12	Develop markets for locally produced timber, wood and woodland products	Government, LEP, local authorities, Confor, local forestry and woodland businesses. Woodland Trust
WT13	Provide training and upskilling in woodland design and management and practical skills such as felling and coppicing	Universities and colleges, FC, Confor, FWAG, National Trust, environmental education charities
WT14	Promote and support forms of forestry and woodland business diversification that deliver local energy production appropriate to the AONB	Government, CNL Board, local authorities, NFU, CLA, FC, Woodland Trust, Confor, Energy Agencies
WT15	Encourage public participation and education in traditional forms of woodland management and crafts, raising awareness of historic values of woodland and recreational health benefits.	CNL Board, Woodland Trust, National Trust, wildlife trusts, local educational and environmental trusts e.g. Sladebank Woods

Historic and Cultural Environment

The Cotswolds have a particularly rich historic and cultural environment ranging from Neolithic long barrows to Second World War airfields. The Historic Environment Record contains over 17,000 sites within the Cotswolds AONB, including 452 scheduled ancient monuments. The CNL also has 10,433 listed buildings.

The historic dimension of the wider landscape is an important part of the character of the Cotswolds, with 121 historic landscape types identified in the Cotswolds Historic Landscape Character Assessment (HLCA), of which 43 are primary. The Cotswolds were once an area where open field agriculture predominated. Consequently the dominant historic landscape type reflects the enclosure of former open fields, which at their maximum extent covered 65% of the CNL.

The historic and cultural environment is not a static aspect of natural beauty, but the product of ongoing change. The challenges posed by climate change mostly concern ways in which its effects are managed, and opportunities are taken, using lessons from inherently more sustainable past practices, to sustain the historic character of the National Landscape into the future.

Parklands, gardens and historic sites such as the Rollright Stones and Great Witcombe Villa capture and store carbon in grassland and trees. Timber in traditional buildings in the form of frames, trusses, floorboards and window frames etc. lock away carbon, in many instances for centuries.

Traditional buildings are inherently sustainable. The whole life cycle of site clearance, winning, manufacturing, transporting building materials, construction activity, maintenance and repair that represents embodied energy can be annualised at very low levels in pre 1919 buildings. This is offset by relatively more fuel being used for heating etc and relatively poor insulation.

Measuring embodied carbon⁵⁰ shows that maintaining, refurbishing and retrofitting traditional buildings can reduce carbon emissions in the built environment by over 60%⁵¹ by 2050 compared to new building.

Refurbishment of 25% of all pre 1919 homes in England over 25 years would reduce carbon emissions by 10% or 15.5 million tCO₂ equivalent in relation to the baseline do nothing scenario⁵².

Refurbishing 50% of all pre-1919 residential buildings over a period of ten years would lead to a reduction in carbon emissions of 27% or 39.6 million (tCO₂ equivalent) by 2050 compared to the baseline⁵³.

As the move to low carbon energy sources accelerates, the relative 'greenness' of historic buildings increases dramatically because of the very low annualised embodied carbon. In the Cotswolds this is

⁵⁰ According to the UK Green Construction Board, when construction, transportation and buildings' electricity use are taken into account, the built environment sector is responsible for up to 42% of total greenhouse gas (GHG) emissions in the UK (UKGBC).

⁵¹ <https://historicengland.org.uk/content/heritage-counts/pub/2019/hc2019-re-use-recycle-to-reduce-carbon/#:~:text=THERE'S%20NO%20PLACE%20LIKE%20OLD%20HOMES,-5&text=Heritage%20Counts%20is%20an%20annual,responsibilities%20for%20the%20nation's%20heritage.>

⁵² <https://historicengland.org.uk/content/heritage-counts/pub/2019/hc2019-re-use-recycle-to-reduce-carbon/>

⁵³ <https://historicengland.org.uk/content/docs/research/valuing-carbon-pre-1919-residential-buildings/>

even more advantageous because of the historic use of local stone, slates or thatch rather than ceramic materials, lime rather than cement thereby avoiding a lot of energy used in manufacturing.

The impact on the heritage value of buildings should be considered as part of development proposals⁵⁴ and whole building approach taken⁵⁵. Retrofitting of traditional buildings needs to be carried out responsibly.⁵⁶

Predicted impacts on the historic and cultural environment

Historic assets that have survived previous extreme events and significant warming since the Little Ice Age (early 14th to mid-19th centuries) may indicate a resilience and reflect ongoing adaptability to changing circumstances that will become a further part of their history.

For the most part impacts will be severest where effects of and responses to climate change exacerbate ongoing human pressures that already take their toll.

Warmer, drier summers and wetter winters, along with an increase in extreme weather events such as drought, frost and flooding, would increase the extremes of wetting and drying leading to accelerated decay of stonework and an increased risk of ground subsidence. On the other hand, many historic buildings have more adaptable materials (timber, lime mortars and renders) that are more forgiving than modern engineered structures and have suffered movement over many centuries with long histories of repair – and resultant ‘wonky’ characteristics. Relatively dense urban settlement (including terraced housing) has several inherently sustainable characteristics in optimising use of land and materials.

Aside from extreme cold weather events milder winter will result in less frost damage.

Increased flooding and erosion may cause damage to buildings and to archaeological sites such as earthworks and buried archaeological deposits, as well as to vernacular features like walls and barns in vulnerable locations (though most historic settlements in Cotswold valleys avoided floodplains).

Structural damage, particularly to buildings and monuments, can also be caused by strong wind, either directly or where trees suffer windthrow in historic parks and gardens. Hotter, drier summers can also increase pressure on owners to pursue building adaptation and alterations that may be unsympathetic to historic character, increase damage from ultra-violet radiation and increase the risk of fire.

The Cotswolds is one of the most sensitive areas in the country for cultivation damage to archaeological sites such as earthworks and buried archaeological deposits. The key factors that determine such vulnerability include soil composition, slope and erodibility, types of cultivation and different crops.⁵⁷ These are interlinked, but the light brashy soils on sometimes significant slopes are key to making the Cotswolds vulnerable to erosion, so that even where cultivation is carried out at

⁵⁴ <https://historicengland.org.uk/images-books/publications/statements-heritage-significance-advice-note-12/heag279-statements-heritage-significance/>

⁵⁵ <https://historicengland.org.uk/images-books/publications/eehb-how-to-improve-energy-efficiency/heag094-how-to-improve-energy-efficiency/#:~:text=%3C%20%3C%20Contents-.2.2%20What%20is%20a%20'whole%20building%20approach'%3F,comfortable%20and%20healthy%20indoor%20environment.>

⁵⁶ <https://historicengland.org.uk/images-books/publications/planning-responsible-retrofit-of-traditional-buildings/responsible-retrofit-trad-bldgs/>

⁵⁷ DEFRA Research Projects [BD1701](#), [BD1704](#), [BD1705](#), [LM0426](#) see <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=Home&Completed=0>

the same relative depth, shallow archaeological sites are gradually truncated. Increased rainfall and run-off from bare ground is liable to accelerate erosion. However, there are counter trends (shallower cultivation to save expensive fuel, better soil management, more retention of winter stubbles) that may help to reduce this problem.

Changes in agricultural practices and crops could threaten the visibility, integrity and setting of archaeological remains and historic landscapes, particularly historic designed landscapes and traditional farm buildings.

As with farming and forestry, there is an increased risk to buildings and historic landscapes (such as landscaped parks) from pests, diseases and introduced species.

Actions to mitigate and adapt to climate change, such as tree planting, developing low carbon energy sources including biomass crops and associated infrastructure or creating new flood defences and farm reservoirs, can affect archaeological remains and historic buildings, and compromise historic landscapes. Poorly designed or inappropriate energy saving measures can detract from the historic character and fabric of buildings and landscapes.

There are great opportunities to revive historic practices in construction and land management that were always inherently sustainable and rooted in the character of the landscape

Aim

The historic environment of the CNL should be managed to protect it from the negative impacts of climate change, whilst making a positive contribution to the understanding of such impacts and to how to contribute to their mitigation and adaptation and develop best practice.

Strategy

	Strategy	Stakeholders
H1	<p>Promote and support the reduction of carbon emissions from traditional Cotswold buildings and adaptation to a changing climate whilst retaining and enhancing their special characteristics by:</p> <ul style="list-style-type: none"> • Producing guidance for building owners • Promoting and further developing conservation-led approaches and solutions to re-purpose, refurbish and retrofit traditional buildings. • Avoiding replacement where encapsulated carbon benefits can be sustained into the future • Promoting traditional building materials and techniques that are resilient and/or adaptable to climate change 	<p>Planning authorities, HE, CNL Board, Property owners and managers,</p> <p>Government (national policy and guidance)</p>
H2	<p>Manage the historic environment to prevent or minimise damage or loss due to the impacts of climate change and adapt in new ways that remain</p>	<p>HE, local authorities, landowners and managers, NE</p>

	sensitive to historic values and significance	
H3	Encourage appropriate design of new energy efficient buildings. New build can incorporate modern techniques as well as old traditional methods re-invented. Increase and broaden reuse of recycled building materials	Local authorities, HE, architects and developers, Government (national policy and guidance)
H4	Ensure schemes reflect historic landscape characteristics to minimise the visual and physical impact on the historic environment of mitigation schemes such as flood defences, renewable energy infrastructure and tree planting by	EA, FC, HE, local authorities
H5	Improve data and evidence on the climate change impacts on heritage and cultural assets in the Cotswolds and their contribution to climate change mitigation	HE, CNL Board, local authorities,
H6	Improve awareness of the risks of erosion and crop changes on archaeological sites under cultivation in the Cotswolds, map areas of highest risk encourage farm partnerships to invest in means to combat problems such as no till cultivation methods.	HE, DEFRA, CNL Board
H7	Develop ELMS measures that specifically address ways to mitigate direct and indirect impacts of climate change on the historic environment – especially redundant farm buildings and archaeological sites under cultivation.	Defra (HE, Council for British Archaeology)
H8	Develop historic landscape guidance on suitable locations for woodland planting to reflect long terms patterns of woodland	CNL Board (FC)
H9	Develop guidance on inherently sustainable historic patterns of settlement, building materials and construction that reflect the historic character of the Cotswolds	CNL Board, HE, local planning authorities, architects, landscape architects
H10	Collate and disseminate case studies that illustrate key recurrent issues and best practice in addressing them	HE CNL Board NT other property owners and managers, Historic Houses Association
H11	Raise public awareness of cultural heritage values and benefits of integrating conservation and	Historic England, historical organisations and societies e.g SPAB, Victorian Society, Bath Preservation Trust.

	enhancement of the historic environment including health and sense of place values.	
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Buildings and new development

The Oolitic limestone of the Cotswolds is a particularly strong unifying force. It is the building block of the Cotswold landscape, its drystone walls, churches, grand houses and vernacular architecture of the towns and villages. The unifying character of stone and the distinctive settlements, high architectural quality and integrity are special qualities of the Cotswolds National Landscape

The construction, operation and maintenance of the built environment accounts for 45% of total UK carbon emissions (27% from domestic buildings and 18% from non-domestic buildings) The total operational and embodied carbon footprint of the built environment is 22% of the UK total. Construction of new buildings emits 6% of UK emissions (of which products contribute 55%, transport 10%, and construction 20%).⁵⁸ Newly constructed buildings are more energy efficient, but 80% of buildings in 2050 have already been built. This is likely to be higher in the Cotswolds due to policies limiting development in protected landscapes and to retain the historic structure and appearance of settlements and listed buildings. 21% of England's residential housing stock pre-dates 1919 and only 12% of homes have been built since 2000 so a major priority is decarbonising our existing stock⁵⁹. Heritage Counts shows that the carbon emissions of historic buildings can be reduced by 60% through refurbishment and retrofit⁶⁰.

Homes are the second largest consumers of energy after transport (which consumes 40% of UK energy). 28% of all UK energy is consumed by homes. Some 65% of this energy is used for space heating (heating the air), with a further 15% for water heating. Reducing energy consumption for heating is therefore a priority. The energy use of homes is influenced by multiple factors: the building's location, orientation, design, construction and engineering services, but also the way it is used, managed and maintained.⁶¹

Traditional buildings also behave differently to modern construction, and it is important to understand this difference when considering retrofitting. Buildings of traditional construction tend to have greater thermal inertia than their modern counterparts – they heat up and cool down more slowly. This ability to 'buffer' moisture and heat helps to even out fluctuations in humidity and temperature⁶².

New built development must be designed to achieve net zero standards and seek to minimise embodied carbon through the fabric of the building, plot orientation and incorporation of low carbon energy and heat generation whilst still keeping in character with the traditional style or making reference to it. A framework to achieve net zero in new build has been developed by the UK Green Buildings Council⁶³ and by Cotswold/West Oxfordshire/Forest of Dean District Councils⁶⁴. The cost uplift to achieve a net zero new building is around 7-10%⁶⁵. This should not be seen as an additional cost, but as part of normal building practice.

⁵⁸ <https://www.ukgbc.org/climate-change/>

⁵⁹ <https://www.ukgbc.org/climate-change/>

⁶⁰ <https://historicengland.org.uk/content/heritage-counts/pub/2019/hc2019-re-use-recycle-to-reduce-carbon/>

⁶¹ <https://historicengland.org.uk/content/heritage-counts/pub/2020/hc2020-know-your-home-know-your-carbon/>

⁶² <https://historicengland.org.uk/images-books/publications/eehb-how-to-improve-energy-efficiency/heag094-how-to-improve-energy-efficiency/>

⁶³ <https://www.ukgbc.org/wp-content/uploads/2019/04/Net-Zero-Carbon-Buildings-A-framework-definition-print-version.pdf>

⁶⁴ <https://www.cotswold.gov.uk/media/05couqdd/net-zero-carbon-toolkit.pdf>

⁶⁵ <https://www.cse.org.uk/downloads/file/cost-of-carbon-reduction-in-new-buildings.pdf>

The design of new buildings, infrastructure and retrofit schemes should properly consider lighting. Poorly designed and unnecessary artificial lighting wastes energy and causes light pollution. Owners of domestic and commercial property and highway authorities should review the need for existing lighting making sure it is only used where and when needed and is designed to be dark sky compliant.

The embodied carbon in items within the building such as metal and plastic in heating systems needs to be better understood and taken into account and industry knowledge in this respect continues to grow and become more sophisticated.

Manufacturers of building materials such as bricks and concrete blocks are looking to reduce their need for raw materials by using a percentage of waste products such as clinker.

Unlike brick and concrete, Cotswold stone as a building material has low embodied carbon. Once dug, worked, transported and used in construction Cotswold stone lasts for centuries and can be re-used.

Good quality timber used in building can also last for centuries and captures and stores carbon whilst growing effectively locking it away.

Predicted impacts of climate change on development.

The built environment faces increasing risks from the impacts of climate change. These include extreme weather events, flooding, subsidence and overheating, particularly in towns and villages due to the Heat Island Effect. Maintenance costs as a result are likely to increase. Buildings prone to flooding will have increasing insurance costs or prove impossible to insure. The long life cycle of buildings creates the risk of ‘energy use lock in’.

To reduce carbon emissions buildings will be required to become highly energy efficient. New buildings will need to be net zero, energy and water efficient and climate change resilient

Design, layout and materials used in the Cotswolds will need to change whilst retaining or referencing traditional Cotswold character. Existing buildings will need to be much more energy efficient through a programme of retrofitting. Advice and guidance will need to be provided to the construction sector and property owners in the Cotswolds.

Green Infrastructure and Sustainable Drainage Systems will become an increasingly important element of the setting of new building design and retrofitting as a way of incorporating and using Nature Based Solutions to mitigate and adapt to the impacts of climate change and to achieve net zero targets

Aim

That development and the built environment is carbon neutral and resilient to the impacts of climate change whilst retaining, referencing or enhancing the traditional character of the relevant area of the AONB.

Strategy

	Strategy	Stakeholders
BD1	Seek to ensure that all new development in the Cotswolds,	Planning authorities, developers, architects, Planning Inspectorate

	domestic and commercial, achieves net zero standards and minimizes embodied carbon. This should be achieved on-site where practicable.	
BD2	<p>Ensure new development should comply with the following standards:</p> <ul style="list-style-type: none"> • fabric of development should be designed to standards of ultra-low energy demand • development should be fossil-fuel free • development should have net zero-operational carbon balance and deliver 100% of energy consumption using renewables • embodied carbon should be minimized • thermal comfort and risk of overheating should be assessed, as part of development proposals, and passive design measures to mitigate for overheating risk prioritised over the use of more energy-intensive alternatives 	Local authorities, architects, developers
BD3	Establish and support retrofitting of existing buildings to become energy and water efficient. Retrofitting should aim to achieve net zero rating and be compatible with conserving and enhancing historic character, especially where designated/listed.	Government, planning authorities, developers, architects, conservation architects, Historic England
BD4	Incorporate in new, renovated and ideally retrofitted buildings forms of low carbon energy and heat that are consistent with AONB and Board objectives	Local authorities, builders/developers, architects,
BD5	Seek to ensure that design, layout and materials used whilst retaining or referencing the traditional character of the relevant area of the CNL in accordance with local design policy and guidance.	Planning authorities, developers, architects, conservation architects, HE, heritage consultants
BD6	<p>Promote the use of Cotswold stone within the CNL as a building material with low embodied carbon.</p> <p>Encourage and develop use of other low-embodied, naturally sourced</p>	Planning authorities, architects, conservation architects

	building materials (eg lime-reinforced rammed earth, clay straw etc.)	
BD7	Reduce use of high CO2 materials such as cement, concrete and steel wherever substitutes are possible. Promote the use of timber in new building and renovations to lock carbon in the structure and reduce embodied carbon Increase use of straw, lime based mortars renders and timber frame in-fill.	Planning authorities, developers, architects, conservation architects
BD8	Seek to ensure appropriate green infrastructure (including communal microgeneration and water management) is incorporated in the setting of new development and retrofitting schemes	Planning authorities, developers, architects,
BD9	Promote Defra's Code of Practice for the sustainable use of soil on construction sites ⁶⁶	Local authorities, architects, Defra
BD10	Promote the re-use and recycling of buildings and building materials where possible, reducing the use of raw, primary materials and materials especially those with a large carbon footprint. Stimulate new businesses/recycling networks to recycle building materials	Planning authorities, developers, architects, LEPs, local authorities
BD11	When reusing and retrofitting, ensure low carbon technology is included to avoid wasting energy and carbon whilst maintaining the heritage value and natural benefits of traditional homes and buildings	Planning authorities, developers, architects, conservation architects, Historic England
BD12	Seek to ensure that all new and retrofit development recognises the need to compensate for hotter summers and extreme weather events	Local authorities, developers, architects,
BD13	Seek to ensure new, renovated, and extended buildings have charging points for electric vehicles	Local authorities, developers/builders, architects,
BD14	Establish training programmes and peer to peer networks for builders, architects, and planning officers to	Universities/colleges, RTPi, local authorities, conservation bodies (IHBC, SPAB)

⁶⁶ <https://www.gov.uk/government/publications/code-of-practice-for-the-sustainable-use-of-soils-on-construction-sites>

	understand, traditional buildings, materials, design etc. to achieve net zero standard buildings	
BD15	Provide advice and guidance on retrofitting buildings, particularly traditional buildings.	Historic England, Local authorities, consultants, conservation architects
BD16	Provide training to upskill builders in retrofitting materials and techniques	Colleges, building companies

Transport

The Cotswolds National Landscape is easily accessible from major population and tourist centres, with motorways and other high-speed roads passing through or close by the AONB, whilst four railway routes cross the AONB and a fifth runs parallel to the scarp between Birmingham and Bristol. For international visitors, Bristol and Birmingham airports are also close and Heathrow is about 1 hour away via the M4 or M40.

Good accessibility has favoured tourism, and also enabled commuting from the CNL to major economic centres such as Bristol, London and Birmingham etc and has encouraged second homes. Due to high house prices, many low paid workers commute into the Cotswolds from surrounding population centres.

The volume of traffic, especially visitor traffic is identified as an issue by both residents and visitors to the Cotswolds, causing congestion and impacting on tranquillity, one of the Special Qualities of the CNL. The number of delivery vans, particularly using narrow lanes and village roads, is also considered to be an increasing issue and the numbers will have grown further due the Covid pandemic and rise in home shopping.

The A417 'missing link' at Crickley Hill, subject to development consent, is likely to be constructed with completion by around 2025 resulting in an increase in traffic and easier access to this part of the CNL.

Due to the rural character of the CNL, reliance on the private car is very high with an average of more than 2 cars per household. However, 3% of households in the CNL have no car and are reliant on public and/or community transport.

Regular bus services link main centres but most villages have an infrequent or no service. Services are reduced or cut due to lack of passengers but this is sometimes due to their infrequency and running at the wrong times. Access to public transport information, particularly timetables, is limited. County bus route maps are no longer published for the Cotswolds area. Rural bus stops no longer have timetables but direct people to Traveline. This assumes access to a smartphone and reasonable signal at the bus stop.

Across the Cotswolds are a number of disused railway lines as a result of the Beeching cuts. Some may have the potential to be re-opened using Very Light Rail technology such as between Cirencester and Kemble

Carbon emissions from transport have dropped by 3% since 1990 but transport remains the largest carbon emitting sector at 28% and accounts for 50% of UK nitrous oxide emissions⁶⁷. Cars contribute 55% of domestic transport emissions and HGVs and vans 33%⁶⁸. 79% of domestic freight is moved by road.

The ownership of electric and plug-in hybrid cars is slowly increasing. There are now over 240,000 battery electric and plug in hybrid vehicles registered in the UK, nearly 230,000 of which are ultra-

⁶⁷ Transport Statistics Great Britain

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/945829/tsgb-2020.pdf

⁶⁸ Decarbonising Transport: Setting the challenge

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932122/tdecarbonising-transport-setting-the-challenge.pdf

low emission cars, up from just over 1,300 ultra-low emission cars in 2010. This will help reduce carbon emissions but will not deal with levels of traffic and congestion.

The sale of new combustion engine vehicles will be banned from 2030 and hybrid vehicles by 2035. As a result, car manufacturers are rapidly moving to electric vehicle production. However, barriers to all-electric vehicles are purchase cost, range between charges, charging infrastructure and charging time. All-electric vehicles are considerably more expensive to purchase than combustion engine vehicles, but they cost less to run, and the purchase price is expected to drop significantly by 2030. Range is limited but battery technology is improving. It should be noted that 94% of car journeys are less than 25 miles and 58% under 5 miles. One solution for long journeys using EVs would be to encourage electric car hire particularly from public transport hubs and visitor accommodation.

The charging infrastructure across the UK is still very limited with 25,000 public charge points available (3 million will be required by 2035) of which 2,600 are rapid charge points and around 120,000 domestic charge points. Across the Cotswolds National Landscape there are currently less than 50 public charge points⁶⁹. However, an EV charging station is due to be constructed on the Fosse Way at Bourton-on-the-Water. The charging infrastructure, particularly fast-charging, needs to increase significantly in the Cotswolds and surrounding area to act as a pull factor for visitors.

Most drivers will want to charge their car at home or the workplace, however 20-30% of motorists have no off-street parking and in urban areas 25% of cars are parked on the street overnight. From 2022 all new homes are required to have EV charging points leading to 145,000 charging points installed every year⁷⁰ and all non-residential development with more than 10 car parking spaces will require at least one EV charging point.

Hydrogen fuel cell technology has been available for some time, but the main barrier has been a lack of a fuelling network, difficulty and cost. This is likely to change due to the carbon Net Zero target and ban on internal combustion engines. Hydrogen Fuel Cells could, in the longer term, provide the way forward for vans and HGVs as well as an alternative to all-electric cars. Hydrogen fuel cell vehicles refuel in a similar way as petrol and diesel vehicles. Government analysis suggests that 20-35% of UK energy consumption by 2050 could be hydrogen based. In August 2021 the Government launched the UK Hydrogen Strategy⁷¹ which sets out how progress will be made to deliver the 250 – 460 TWh of hydrogen needed by 2050.

National and local policy seeks to encourage a shift from car use to public transport and active travel (cycling and walking), particularly for shorter journeys and commuting. There is potential to transfer local trips from the car to active travel modes; and there is potential to link with the rail network which offers good quality links and regular services between the Cotswolds and key regional centres. Locating new development near to services and transport nodes along the lines of the '20 minute neighbourhood'⁷² helps to achieve this.

⁶⁹ Zap Map <https://www.zap-map.com/live/>

⁷⁰

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040254/consultation-response-electric-vehicle-charging-in-residential-and-non-residential-buildings.pdf

⁷¹

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011283/UK-Hydrogen-Strategy_web.pdf

⁷² <https://www.tcpa.org.uk/the-20-minute-neighbourhood>

The Coronavirus pandemic has made many people and employers realise working from home supported by technology is a realistic and often more effective and cost efficient option and reduces the need to travel to the office and meetings. Rural internet speeds have improved in many Cotswold communities due to the installation of fibre optic broadband, but line-speed and stability are still problem for many.

Long distance domestic road freight should be reduced by moving more goods by rail and by using more locally produced goods. HGV movements have a particularly significant impact in terms of noise, vibrations etc and in places such as Chipping Norton contribute significantly to poor air quality.

Predicted impacts of climate change on transport.

High temperatures can damage rail and road infrastructure through thermal loading, buckling rails, road rutting and overheating of equipment (traffic lights etc) and engines. High temperatures can also cause passenger discomfort leading to a shift in demand and in peak travel times and a move away from public transport to cars with air conditioning. High road surface temperature increase risk of skidding

Extreme weather events such as gales and heavy rain can adversely affect road and rail safety as well as leading to flooding, erosion, subsidence, damage to equipment and travel disruption. Warmer, drier weather may lead to increased visitor numbers resulting in traffic congestion, increased noise levels and reduced air quality.

The rail line crossing the CNL between Alderton and Old Sodbury has been electrified bringing gantries, cables, fencing and a transformer station. Although modified gantries were used within the CNL to reduce impact, there is still a significant visual impact. Electrification of the other three lines that cross the Cotswolds will have significant impact on the landscape. Hydrogen fuel cell powered trains would, however, remove the need for electrification.

Climate change mitigation and adaptation policy aims to move people away from cars to using public transport and active travel. Public transport providers are likely to need financial incentives to increase routes and frequency. Increasing active travel requires improved infrastructure for walking and cycling including safety measures such a separation from vehicles.

High temperatures and humidity and wet weather result in a reduction in walking and cycling. Designing new development, and retro-fitting in existing areas, can create a micro-climate, e.g. through the use of street trees and substantial planting of a green infrastructure network, making active travel more comfortable

Growing use of electric vehicles will significantly increase demand for electricity supply and charging infrastructure which will also require an upgrade of the supply grid.

Aim

That emissions from transport are significantly reduced, electric vehicle charging infrastructure is substantially increased along with an increase in public transport use and active travel to reduce car use and that transport infrastructure becomes resilient to the effects of climate change.

Strategy

	Strategy	Stakeholders
T1	Promote and support the travel hierarchy – avoid/reduce the need to travel, walk, cycle, ride, public transport, car	Government, local authorities, LEPs, individual businesses
T2	Develop a CNL-wide interregional (SW, WM, SE, EM) strategy to encourage a major intermodal shift from road to rail, reducing CO2 emissions of both transport infrastructure construction and operation, while also delivering substantial benefits to the CNL in greater tranquillity, less congestion and less HGV and car intrusion in places that are of especial value to the character and economy of the CNL	DfT, regional and country strategic transport bodies, National Highways, local authorities, CPRE, Transport Action
T3	Avoid endangering the viability of increased rail capacity by investment in highways schemes that increase rather than decrease traffic levels in areas especially sensitive to intrusion.	DoT, regional and country strategic transport bodies, National Highways, local authorities, CPRE, Transport Action
T4	Ensure all county-based initiatives to improve transport and relieve road congestion/intrusion within the CNL not only consider the problems to be solved but also the dangers of off-loading them elsewhere (eg onto less suitable roads or concentrating more traffic through key market towns or at other sensitive locations)	DoT, regional and country strategic transport bodies, National Highways, local authorities, CPRE, Transport Action
T5	Improve Broadband connectivity and speeds to reduce the need to travel enabling increased remote and hybrid working	Broadband/internet providers, local authorities, developers.
T6	Seek to ensure that transport infrastructure is resilient to the impacts of climate change, particularly extreme weather events. Ensure design and materials are as far as possible bespoke and conserve and enhance the Cotswolds AONB.	National Highways, Network Rail, highway authorities (LTPs), planning authorities, developers, architects, CNL Board.
T7	Increase the network of public charging points, including fast-charging, for electric vehicles	National Highways, local authorities, businesses
T8	Ensure all new domestic housing development to have EV charging points and/or access to communal EV charging points.	Planning authorities, developers
T9	Ensure all new commercial development (offices, attractions etc) to have EV charging facilities.	Planning authorities, developers, attractions
T10	Focus new (housing) development in settlements that are higher in the local authority 'settlement hierarchy to maximise proximity' to services (shops, post offices) and transport hubs.	Local authorities

T11	Encourage and support retrofitting of EV charging points in car parks, commercial and domestic properties	Government, local authorities, businesses, tourist attractions, accommodation providers, homeowners
T12	Encourage provision of electric cycle charging points.	Employers, attractions, pubs & hotels
T13	Encourage and support the switch to EV or very low emission buses, delivery vans and HGVs	Government, local authorities, businesses,
T14	Provide training to motor mechanics to maintain and repair electric vehicle.	Institute of the Motor Industry, colleges, EV retailers
T15	Encourage and support innovation that reduces duplication of delivery transport. Encourage 'last mile' delivery schemes e.g., community pick-up points	Local authorities, local businesses
T16	Promote the use of public transport and reduced use of the private cars	Local authorities, Dept for Transport, CNL Board, tourist attractions, accommodation providers, bus and rail companies
T17	Ensure public transport is an attractive option by making it affordable, accessible, efficient, regular and direct, particularly at peak travel times – with easy to access timetables and integrated ticketing. Encourage and support Demand Responsive Transport	Government, Local transport authorities, bus and rail operators, community bus schemes GCC Better Transport for Rural Gloucestershire – North Cotswolds Trial
T18	Encourage visitors to explore the Cotswolds using 'active travel' and low/no emission transport through well designed and well publicised information on walking and cycling routes, public transport, cycle, electric cycle and EV hire	CNL Board, DMOs, local authorities, accommodation providers, attractions, bus and rail operators
T19	Reintroduce published public transport maps	Local authorities
T20	Improve cross county boundary bus links	Local authorities, bus operators
T21	Encourage bus operators to have provision to carry cycles.	Local authorities, bus operators
T22	Ensure increased opportunities for safe 'Active Travel' e.g. Cycle lanes, well maintained rights of way network, facilities for cyclists at places of work etc Support Active Travel initiatives that encourage walking and cycling to and within the CNL	Local authorities, Department for Transport, Active Travel England, businesses including tourist attractions and places of work,
T23	Encourage and support provision of secure cycle parking facilities in towns, villages, tourism attractions and rural car parks etc	Local authorities, DMOs, local trade, associations, tourism attractions.

T24	Encourage and promote the production and purchase of local goods to reduce the need for road freight.	Government, local authorities, purchasers such as schools and NHS, food producers.
T25	Encourage and support more freight to be transported by rail	Rail Freight Group, rail freight Companies, Government, Office of rail and Road, Local Authorities
T26	Engage with Network Rail at an early stage when further rail line electrification is proposed	CNL Board, local authorities

Energy

During 2020 42% of the UK's energy was produced from low carbon (renewable) energy sources exceeding generation by fossil sources for the first time (nuclear 16% and fossil fuels 39%)⁷³. Low-carbon electricity can now be produced more cheaply than high-carbon electricity in the UK and globally⁷⁴.

Oil and gas boilers in new homes and commercial properties and as replacements in existing properties are to be phased out by 2033⁷⁵. The replacements are most likely to be by electric heating. Electricity generation from coal will cease by 2024 and all nuclear plants are expected to be retired by 2030 except Sizewell B and Hinkley C (due to start generation by the mid 2020s).

Due to the shift from fossil fuel power and heat generation, the move to electric vehicles and growth in housing the demand for electricity is likely to double by 2050. Consequently, low carbon generation needs to increase significantly.

The rough estimate⁷⁶ for projected electricity consumption for domestic households within the CNL (power, heat, EV charging) is 545GWH/yr. To produce this solely from photovoltaics (PV) would require 1,100ha (11km²) or from wind either 230 wind turbines with blade tip of around 80m or 36 wind turbines of blade tip around 250m. Using solely biomass converted to electricity would require around 109,000ha, about 25% of the agricultural land in the CNL.

Some forms of low carbon energy production in or immediately adjacent to the CNL can be more controversial than others, for example energy from wind turbines or nuclear power. Whilst further from the area of the CNL, nuclear power as a source of energy together with potential nuclear fusion technology are both of interest to the CNL. Information on the environmental effects of the latter is still being assessed.

There are opportunities within the Cotswolds to exploit sources of low carbon energy which are, in the right location, consistent with AONB designation and can help meet local demand. These can include the use of biomass such as wood fuel, solar power, anaerobic digestion (AD), air and ground-source heat, wind and micro-hydro. There is significant domestic and commercial roof space that can host PV arrays. Biomass and AD energy can, however, have adverse impacts in the form of increased vehicle movements, particularly in the relatively tranquil areas of the AONB and take a significant area of land out of agricultural production. To reduce bulk and increase ease of handling, some energy crops are processed into pellets which can increase their embodied carbon negating their low carbon status. The CNL provides a good location to pilot and test new technologies appropriate for the landscape.

As technology improves, ground and air-sourced heat pumps are likely to become more affordable, efficient and quieter.

A key constraint to local energy production is the capacity of the electricity grid and significant upgrading needs to be undertaken by National Grid and the regional power distribution companies.

⁷³

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/972790/Energy_Trends_March_2021.pdf

⁷⁴ <https://www.theccc.org.uk/publication/sixth-carbon-budget/>

⁷⁵ Residential oil 2028, commercial oil 2026, domestic and commercial gas 2033.

⁷⁶ C. Crookhall-Fallon, Cotswold District Council, May 2021

Energy storage technology to overcome ‘intermittency’ of low carbon energy and improve grid management is advancing including batteries, hydrogen cells, thermal storage and compressed air, recharging using excess energy during periods of low demand.

Individuals and communities within the Cotswolds are increasingly exploring ways of producing their energy needs. Results from the Future Landscape workshops (2019) showed there is clear interest in the idea of small-scale energy production that benefits the local community. The most popular was photovoltaics on roofs and small field arrays.

Predicted impacts of climate change

Climate change is likely to have a considerable impact on energy use in the CNL due to the national and international drive to reduce carbon emissions increasing demand for low carbon electricity for heating and vehicle charging

The move from fossil fuel heating in domestic and commercial properties, combined with new development and demand for electricity to charge electric vehicles will increase demand for electricity in the Cotswolds.

Reducing energy use through improved efficiency and insulation can present issues with traditional building designs and materials, so specialist architectural advice will be required. As ambient temperatures increase such interventions will be increasingly helpful both in the summer and the winter

Demand for local sources of low carbon energy and heating can be expected to increase. Support from government and energy generation companies is likely to increase. Whilst the Cotswolds can produce more energy, care needs to be taken to avoid adverse effects on the natural beauty and special qualities of the CNL.

There will probably be a higher demand for more community-based energy schemes such as small scale solar and wind power that benefit individual settlements, though schemes in open countryside need to be weighed against their landscape and visual impact including impacts on tranquillity.

Increased demand for firewood, woodfuels and feedstock for AD is likely to benefit existing woodlands and unimproved grasslands by providing an economic function for these habitats which could enhance their management benefitting landscape and biodiversity. However, management could become unsustainable as demand continues to rise leading to over-cropping and if deer and grey squirrel populations are not managed. There are some concerns over woodfuels and impacts on air quality and the balance between emissions and carbon sequestration. The law has now changed requiring moisture content of 20% or less in firewood⁷⁷ and the industry should be encouraged to improve the efficiency of stoves and boilers to reduce harmful emissions,

Renewed interest in other forms of energy crop such as miscanthus and short rotation coppice (SRC) could impact on landscape and enjoyment of the public due to their height and semi-permanent/permanent nature and long rotation cycle in the case of SRC. Energy crops including crops such as maize for AD also take land out of food production.

⁷⁷ The Air Quality (Domestic Solid Fuels Standard) (England) Regulations 2020
<https://woodsurre.co.uk/new-regulations-confirmed/#:~:text=You%20should%20not%20burn%20wood,way%20to%20heat%20your%20home.>

Increasing knowledge about the dangers from particulate matter, from burning of wet wood fuel, and concerns about the energy requirements for producing kiln-dried fuel need to be taken into account when assessing new schemes. Existing storage facilities may no longer be suitable and may need to be replaced

Planning of low carbon energy schemes, and assessment of their acceptability, should take account of any necessary associated infrastructure such as access roads, cables and ancillary buildings. Increased demand for domestic schemes may harm the historic environment through their visual impact on traditional buildings and streetscapes. One way to minimise the impact might be to develop district heating schemes.

Aim

The Cotswolds National Landscape seeks to generate low carbon energy and heat for its communities' needs whilst conserving and enhancing the natural beauty and special qualities of the CNL. Traditional Cotswold building become more energy efficient.

Strategy

	Strategy	Stakeholders
E1	Promote opportunities for low carbon energy and heat, taking a landscape led approach to ensure consistency with the purpose of AONB designation and CNL Board purposes and objectives	Local authorities, CNL Board
E2	Provide guidance and support for local communities interested in local low carbon energy and heat generation to ensure consistency with AONB designation	Local authorities, CNL Board
E3	Explore and develop potential for more use of traditional sources of low carbon power at community level where compatible with CNL character (eg water, biofuels etc) especially where this may also indirectly encourage better management of landscape resources and/or help reduce other climate risks	Local authorities, CNL Board, energy companies and consultants
E4	Seek and obtain funding to establish a grant programme to provide specialist advice for improving energy efficiency and insulation in traditional Cotswold buildings	Local authorities, energy companies
E5	Oppose large scale energy production inconsistent with AONB designation.	Local authorities, CNL Board
E6	Support increased biomass production where it is consistent with CNL and Board objectives. Priority should be given to biomass from existing woodlands	Local authorities, CNL Board, FC, NFU, CLA

E7	Oppose proposals for biomass energy systems that rely on crops that diminish food production capacity, not least due to the ancillary traffic movements created and impacts on soils and water quality from winter harvesting	Local authorities, CNL Board
E8	Increase grid capacity to facilitate local low carbon energy production.	Power distribution companies
E9	Promote energy conservation in traditional stone-built buildings whilst retaining visual and architectural quality	Local authorities, CNL Board, Historic England
E10	Encourage significant reduction in artificial lighting where not essential to save energy and enhance Dark Skies	Local authorities, CNL Board Commission for Dark Skies, IDA, local communities
E11	Review and if necessary, revise CNL position statements and guidance on Renewable Energy and the Energy Guide.	CNL Board

The Cotswold Economy

The Cotswolds economy comprises 9,500 businesses with around 54,000 employees. Key sectors in terms of the number of businesses include professional, scientific and technical services and agriculture, forestry and fishing. Business administration and support services, and wholesale, retail and repair of motor vehicles are the most important sectors in terms of employment. Farming and tourism, which are closely associated with the purposes of the Cotswolds AONB, together account for around 20% of employment.

The Cotswolds has an economically active population of around 76,000 (70% of the total population), of which around 55,000 are employees and 17,480 are self-employed. The proportion of self-employed people in the AONB is twice the national average. There is also a higher proportion of managers, professionals, technical staff and skilled trades in the AONB compared to the national average. The unemployment rate is low.

The AONB has a high proportion of well qualified residents, with over 20% having a degree, while the possession of higher qualifications is 40% above the national average

The total turnover of businesses in the CNL is estimated to be around £5.3 million. The total value of this economic activity in the AONB, measured as Gross Value Added (GVA), is estimated to be over £2 billion.

The Cotswolds provide a high quality environment, a good quality of life, a wealthy customer base, access to tourist markets, and a strong brand and image for marketing purposes. The cultural and natural capital of the Cotswolds fundamentally underpin its economy.

The Cotswolds are also centrally located and easily accessible. On the negative side are higher costs, limited staff availability, low housing affordability, limited broadband and transport infrastructure, and a restrictive planning system.

Many CNL residents commute to work outside the AONB to places such as Cheltenham, Gloucester, Bristol, Bath, Oxford, Swindon and London. Likewise, people from nearby towns and cities outside the AONB travel into the Cotswolds to work as they are priced out of the local Cotswold housing market.

There are growing opportunities for new sectors, particularly to develop the 'green' economy and for distributed innovation and new local jobs that can be achieved locally via remote working. Nationally the low carbon economy is predicted to grow by 11% per year up to 2030 creating around 1 million jobs. Competition for jobs and growth between LEPs and combined authorities will be high and will tend to be focussed on main centres such as Bristol, Birmingham, Oxford and the Gloucester/Cheltenham M5 corridor. The Cotswolds AONB is divided across six different LEPs each with their priorities. It is important that the rural economy of the Cotswolds gains its share.

Some restructuring of the economy has occurred due the Covid19 pandemic. Employees and employers have realised that working from home is an option for many and that it works, particularly when supported by technology. For some sectors, home working full time or part time has or is likely to become the norm reducing travel and proving support for local businesses such as village shops and pubs. This may result in reduced pressure on infrastructure at peak times by not commuting to other economic hubs but may increase local pressure as residents remain in the area.

Demand for and reliance on good broadband will grow. House prices and demand for development are likely to increase as people realise, they can work from home but seek more space and better

surroundings. Planning policy within the AONB may restrict the extension of properties or conversion of outbuildings for office space or business expansion and this needs to be taken in account by those looking to move into the area.

Markets are beginning to develop for carbon offsetting, nature-based solutions and environmental offsetting including Biodiversity Net-Gain. This is of particular interest to farmers and land managers as they are developing at the same time as the changes in agricultural subsidies and incentive are taking place.

Specialist local contractors will be required to fit/retro-fit and maintain clean energy systems and retro-fit energy efficiency measures into existing buildings. There is growing interest in localisation of food production. Land diversification and changes in land management will require specialists and contractors e.g., foresters, natural capital valuation, carbon assessors and natural flood management advisers.

Consumers need to be better informed on the impact of their choices on climate change and its mitigation. For example, in the food sector this includes understanding the balance between buying local produce and imported produce. Imported food may be often cheaper to purchase and be available all year but the carbon cost can be much higher in both the transport and production methods. Buying local not only tends to have a lower carbon footprint but can also help support the producer to become more carbon efficient. The same understanding applies to other goods and to travel choices.

Impacts of climate change

Farming may see some short to medium-term benefits in increased yield, farm diversification opportunities from new crops and local food production and processing. The farming and land management sector will also benefit from environmental offsetting and nature-based solutions and low carbon energy production.

The tourism sector will benefit from warmer summers and a longer tourism season supporting new businesses such as accommodation and attractions but in the longer term may face issues from high summer temperatures. The foundation of the tourism industry is the natural beauty of the Cotswolds, and the sector may face issues if the landscape changes too much due to the impacts of climate change or mitigation and adaptation measures.

Popular visitor destinations and attractions may become overcrowded with loss of amenity and tranquillity. Popular walking and riding routes may become overused leading to erosion, litter and higher maintenance costs. Crops and habitats may be damaged, rights of way fenced off from farmland and areas may be deemed un-farmable and abandoned or promoted for other uses.

Businesses in the Cotswolds will need to mitigate and adapt to the effects of climate change and climate change policy for example by improving water and energy efficiency and improving their 'offer' e.g. providing EV charging points and taking precautions against extreme weather events. Some sectors based on 'old' technology will diminish and may even vanish

Supplies of goods and services may be disrupted by extreme weather events and costs can be increased by changes in national and local policy and cost of insurance. With increased expectations from society and customers businesses will need to demonstrate they are changing. This will increase costs but can also provide marketing opportunities.

Aim

The Cotswolds economy should thrive and grow by mitigating and adapting to the impacts of climate change and taking opportunities presented by technology and the shift into the 'green' business sector whilst contributing to the conservation of the special qualities of the Cotswolds AONB.

Strategy

	Strategy	Stakeholders
CE1	Further develop CNL approaches to Cultural and Natural Capital to demonstrate the multi-stranded cultural and economic and social benefits	CNL Board with Historic England, Natural England LEPs, local authorities, Conservation NGOS, CLA, NFU, Confederation for Small Businesses, Tourism Boards
CE2	Ensure LEPs support the rural green economy in the Cotswolds through grants and advice enabling business diversification and new business start-ups	LEPs, local authorities, CLA, NFU, CNL Board, local businesses and entrepreneurs, Confederation for Small Businesses
CE3	Ensure businesses in the Cotswolds have access to green business networks, training and skills development	LEPs, local authorities, CLA, NFU, CNL Board, local businesses and entrepreneurs, Confederation for Small Businesses
CE4	Train and upskill contractors to fit/retro fit low carbon energy systems and energy efficient measures into existing buildings	LEPs, local authorities, CLA, NFU, CNL Board, local businesses and entrepreneurs, Confederation for Small Businesses.
CE5	Encourage and support businesses to measure their carbon footprint and make low carbon changes e.g., energy efficiency, travel, home working and become resilient to climate change. Support business transition to a circular economy Encourage the use of B Corps and the setting up of Community Interest Companies etc.	LEPs, advisers such as Business West, Green Business Grants, CLA, NFU,
CE6	Support businesses to implement digital ways of working including remote access to enable more people to work from home. Improve broadband connectivity and speeds	LEPs, local authorities
CE7	Support businesses to use more local sustainable products and supply chains, supporting business transition to a circular economy	LEPs, Gloucestershire Regenerative Agricultural and Environmental Transition (GREAT) project, local procurement by local authorities, NHS, local charities etc.

CE8	Help consumers to become carbon literate and make more informed purchasing decisions to reduce their impact on climate change	Government, LEPs, consumer organisations, NFU, CLA, local trade bodies, producers, processors and manufacturers.
CE9	Provide advice and support to the farming sector to adapt to and mitigate the impacts of climate change in a way that that supports the conservation and enhancement of the Cotswolds National Landscape.	Defra (ELM SFI) CNL Board, FWAG, NFU, CLA, FarmEd, RAU, Farm Carbon Toolkit, Farm advisers/consultants
CE10	Support farm business diversification that supports the conservation and enhancement of the Cotswolds National Landscape	Local authorities, NFU, CLA
CE11	Support non-farm business diversification that supports the conservation and enhancement of the Cotswolds National Landscape	Local authorities, LEPs, advisers such as Business West
CE12	Provide planning advice to enable business development and expansion	Local authorities,
CE13	Explore how to package local low carbon energy projects, green jobs programmes and land management projects to attract investment by public and private sources of sustainable capital	Local authorities, LEPs, NFU, CLA, renewable energy companies
CE14	Embed in local projects a framework to develop Investor emphasis on environmental impact measurement and increasing market consensus on agreed metrics	Local authorities, developers, LEPs
CE15	Partner with other National Landscapes to “pool” natural capital assets and thereby enhance investability or expand the investor universe	CNL Board and other national landscapes, NAAONB, NPE, Big Chalk
CE16	Seek to ensure continued roll-out of high speed, reliable broadband, particularly Ultrafast Fibre to the premises, supporting existing businesses, business diversification, new jobs and home working.	Local authorities, internet service providers
CE17	Invest and promote investment of renewable energy in ways that are consistent with AONB and Board objectives	Local authorities, renewable energy companies, businesses, Energy Agencies
CE18	Promote sustainable tourism	Local authorities, DMOs, VisitEngland, CNL Board
CE19	Work with partners to seek to ensure the provision of affordable housing to	Local authorities CNL Board

	reduce the need to commute into the Cotswolds for work	
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Tourism, recreation and access

The virtues of the Cotswolds have been extolled since the late 19th Century when William Morris took a joint lease for Kelmscott Manor and began to explore the area. Guidebooks and travelogues began to appear in the early 20th Century. J.B. Priestley described the Cotswolds as ‘the most English and least spoilt of all our countrysides a national heritage of great value’. The result is that the Cotswolds has an especially strong ‘brand’ used by many local businesses, particularly within the tourism sector. There are a considerable number of guidebooks on or featuring the Cotswolds.

The natural and cultural capital of the Cotswolds National Landscape - its high-quality landscape and wildlife, and vernacular buildings, towns and villages built of Cotswolds limestone, cultural life and intangible heritage have made the area a popular and well-established destination for visitors from the UK and overseas. An estimated 23 million visitor days a year are spent in the CNL with over 1.7m staying visitor nights within the Cotswolds District Council area alone⁷⁸, making tourism the most economically important sector in the CNL worth £1bn to the local economy. This in turn has led to the establishment of a wide range of attractions from parks, gardens, historic sites and buildings and museums, to craft centres and shops with goods marketed towards tourists, together with a lively and varied cultural life.

The principal attraction and primary asset for the tourism industry in the Cotswolds is the landscape, traditional stone-built villages, and tranquillity⁷⁹. Visitors score the Cotswolds higher than other countryside destinations for the quality of the natural environment⁸⁰. Within the Cotswolds District Council area 75% of day visits are to the countryside accounting for 67% of day visitor spend.⁸¹ The Cotswolds is a year-round attraction with peaks in July, September, and December. Responses to climate change will need to carefully located and designed to retain the quality of the landscape.

Accessing and enjoying nature, wildlife and the historic and cultural environment has become increasingly popular within the Cotswolds; an area with a rich variety of wildlife, landscapes, historic and cultural sites and associations. Access is readily available on common land, National Trust land, nature reserves managed by the wildlife trusts and other organisations, circa 3,000 miles of public rights of way and a wide variety of heritage sites, historic towns and villages and museums etc. The area contains or is crossed by more than 20 named recreational routes including the Cotswold Way National Trail and a growing number of routes suitable for accessibility scooters and wheelchair users.

Opportunities to improve access and increase the access network should be taken. For example, the A417 ‘Missing link’ proposal includes improvements to the existing walking, cycling and horseriding network, additions and improved links and a new, safer crossing for the Cotswold Way National Trail.

The importance of access to the countryside for physical and mental health and wellbeing has also become better understood over the past few years, particularly in preventing and managing health issues, but the great potential of these benefits is far from being fully developed.

⁷⁸ <https://www.cotswolds.com/dbimgs/Gloucestershire%20&%20districts%202019.pdf>

⁷⁹ Cotswolds AONB Survey 2002, Cotswolds@50 Survey 2016, Future Landscapes workshops 2019

⁸⁰ Cotswolds destination report, Visit England 2018

<https://www.cotswolds.com/dbimgs/Destination%20tracker%202017.pdf>

⁸¹ <https://www.cotswolds.com/dbimgs/Gloucestershire%20&%20districts%202019.pdf>

Predicted impacts on access, recreation and tourism.

Climate influences where tourists come from, where they go and what they do, which has led to the development of a Tourist Comfort Index (TCI) to assist in the tourism assessment of geographic areas. Such analysis shows that up until now the Mediterranean has had the most desirable climate for tourism. However, as a result of climate change, north-west Europe is now seeing an extension of the season when the TCI is more favourable. As a result, an increase in domestic and international tourism activity in the UK is expected.

This is likely to be predominantly focussed around the coastal zone, but the Cotswolds too are likely to experience a longer tourism season and an increase in visitor numbers on the shoulders of the traditional summer peak (i.e. spring/early summer and late summer/early autumn). The peak season itself, however, of June, July and August, could see a decline in numbers, as many may come to find it too hot for traditional activities such as walking, cycling, and visiting towns, villages and attractions.

A longer season and increasing visitor numbers overall are likely to lead to an increase in traffic, litter and noise, and to erosion of infrastructure such as public rights of way and features at popular countryside destinations. A parched summer landscape may also be less attractive and at a higher risk of wildfire. Demand for new and improved infrastructure is expected to increase including space and locations for car parking and provision of electric vehicle charging points, as is demand for water and additional power for accommodation and attractions (e.g., for air conditioning).

For the tourism industry, costs of insurance could rise and efforts to cut emissions may add costs.

Increased numbers of visitors to the CNL would provide economic diversification opportunities for farmers and woodland owners and could increase the profile of and demand for products from the area.

The growing tourism sector is likely to increase demand for holiday lets putting pressure on local housing. Increased tourism at already crowded 'honeypot' locations risks multiple other problems including traffic and congestion and where over-concentrated (especially in relatively confined spaces) can lead to a diminution rather than enhancement of visitor experience.

As people are encouraged to reduce flying, the tourism sector will need to focus on the domestic and near continent markets and away from long-haul markets such as the US and Japan.

How we respond to climate change and how this would impact on the landscape of the CNL needs to be considered carefully. For example, woodland creation, renewable energy infrastructure and changes in land management could diminish the popularity of the Cotswolds as a destination and weaken the brand.

More frequent extreme weather events, particularly heatwaves and storm events will disrupt access and activities, forcing people to stay inside or at home. Rights of way would become difficult to use at times due to mud, flooding and loss or damage to infrastructure such as gates and bridges and surface erosion. Wetter winters will result in people attempting to avoid muddy sections of public rights of way leading to widening resulting in compaction and loss of vegetation including crops. This can pose major challenges to some popular heritage sites with limited space where increased footfall combined with more severe weather poses significant physical conservation problems, especially in winter. A longer growing season will require more management of vegetation growth. As a consequence, the cost of repair and maintenance will increase. Drier summers bring the risk of wildfire.

Pressure on the rights of way network and access land will increase due to the lengthening ‘season’ and the growth in accessing the natural environment. Improvements in outdoor clothing and equipment including e-bikes are enabling activity to be all year round.

Aim

Tourism remains a major part of the Cotswold economy, increases its profile in the off-season and becomes carbon neutral by adopting appropriate mitigation and adaptation measures whilst ensuring that the Cotswold landscape continues to provide a quality experience.

Access and recreation infrastructure becomes resilient to climate change through design, materials, investment and information and guidance for users and land managers

Strategy

	Strategy	Stakeholders
TA1	Through effective messaging and storytelling help visitors understand how they can help care for the Cotswolds and how they can reduce their carbon footprint	CNL Board, DMOs, Green Tourism, local authorities, accommodation providers, attractions,
TA2	Seek to ensure visitors across the Cotswolds have consistent and integrated information and access to services to make it easier to adapt and change behaviours.	DMOs, local authorities, attractions, accommodation providers, CNL Board
TA3	Encourage visitors to use public transport and active travel e.g., concessionary rates at attractions if arrive on public transport, cycle, or foot	Attractions, accommodation providers, transport providers, DMOs
TA4	Offer electric car and cycle hire as a way to explore the Cotswolds, leaving the petrol/diesel car at home or at the accommodation.	Accommodation providers, car hire companies, local businesses, Network Rail
TA5	Discourage flying to visit the Cotswolds by focusing on the domestic and near continent markets and highlighting lower carbon travel options.	DMOs, VisitEngland
TA6	Work with partners to ensure changes in land management and use are consistent with the special qualities of the Cotswolds, the primary asset of the tourism sector.	CNL Board, ELM delivery body, FC, EA, farmers and land managers, local authorities, environmental charities e.g., Woodland trust, Avon Needs trees and Protect Earth.
TA7	Provide support to the tourism industry so that it mitigates and adapts to climate change in ways that are consistent with AONB and Board objectives	local authorities, Green Tourism, DMOs, VisitEngland, Accommodation providers, attractions,
TA8	Encourage investment in the landscape, access and access	CNL Board (Caring for the Cotswolds), DMOs, Green Tourism, local authorities

	management by the tourism sector through a visitor Giving Scheme ⁸²	
TA9	Work with partners to ensure appropriate provision of car parking (with EV charging) at attractions including small informal car parking at points to access the countryside	Local authorities, attractions, DMOs, landowners,
TA10	Manage historical and natural features of interest to take account of the impacts of climate change and the increasing pressure from visitors	NE, EH, local authorities, landowners/managers, wildlife trusts, National Trust
TA11	Raise awareness of the need for better biosecurity to prevent the spread of disease and problem species.	Local authorities, CNL Board, DMOs, VisitEngland, FC
TA12	Work with partners to develop a robust and high quality access network which is resilient to the impacts of climate change, including increased usage and demand for new activities. E.g., increasing height and span of bridges across water courses and drainage ditches to prevent loss or damage in flood events.	Local authorities, farmers and land managers, CNL Board,
TA13	Move towards smaller, pre-emptive type works on public rights of way and access land to avoid the need for larger maintenance projects in the future	Local authorities, CNL Board, farmers, landowners and land managers
TA14	Work with farmers and land managers to understand their concerns about access and help them manage the impacts of tourism and access and create a climate change resilient access network.	Local authorities, CNL Board, farmers, landowners and land managers
TA15	Seek improvements to access provision through ELMs where it will be beneficial.	Defra, ELM delivery body, farmers and land managers, Local Authorities, CNL Board
TA16	Provide training and development for all public rights of way/access staff, volunteers and contractors	Local authorities, CNL Board, National Trust, Wildlife Trusts

⁸² A Visitor Giving or Payback Scheme is where visitors voluntarily donate money to assist the conservation or management of a place

Health and Wellbeing

The health of people living in the Cotswolds is generally better than the national average with a higher life expectancy and higher percentages of healthy eating. Personal wellbeing scores are also relatively high. The Cotswolds have lower rates of early death from cardiovascular disease and respiratory disease and a lower rate of anxiety and depression but slightly higher rates of asthma. Physical activity has dropped by around 5% since 2017. The rate of people killed or seriously injured on roads is significantly higher than the national average.

The trend in the Cotswolds is towards an increasingly ageing population. Representation of all age groups over 45 is significantly greater than the national average whilst all age ranges below 45 are significantly below the national average. Around 24% of the resident population is aged 65+ years increasing by 30.3% since 2007.⁸³

The health and wellbeing benefits of accessing nature and the historic and cultural environment have been known for some time but have come to the fore in recent years and particularly during the 2020/21 Coronavirus pandemic. The health benefits of nature and heritage include improving mood and happiness, reducing stress, while encouraging physical activity can help tackle anxiety and depression. Engaging with nature and the historic and cultural environment can range from leisurely activities such as gardening, visiting a nature reserve or ancient site or enjoying the view from Crickley Hill Country Park to physical activities such as walking, cycling or taking part in a Voluntary Warden work party.

The CNL has much to offer but not everyone has the ability to access and make use of the area. Significant steps have been taken to improve access by removing stiles on footpaths and creating Trumper⁸⁴ routes but barriers remain for many sectors of society within and around the CNL. For example, 13% of children under 16 and 5% of young people aged 16 – 24 never visit the natural environment or spend leisure time outdoors, 18% of children in the most deprived areas never visit the natural environment. Groups which visit the countryside least are those over 65, members of the Asian and minority ethnic population and residents of the most deprived areas of England⁸⁵.

The Landscapes Review proposed a stronger mission to reach out and actively connect all parts of society with National Landscapes, to help those who currently fail to benefit, to increase ethnic diversity of visitors, to expand volunteering and that National Landscapes cater for and improve the nation's health and wellbeing.

Predicted impacts on health and wellbeing

Human health is affected by climate and weather. Though the health effects of predicted climate changes may not be dramatic, they could be significant, especially to those already in poor health. While milder winters are likely to see a reduction in cold related death and illness, warmer summers are projected to see an increase in deaths and illness from extreme heat. Respiratory illness and related deaths are also likely to increase due to air pollution caused by a rise in ground level ozone, and heat and air quality are likely to become particular issues for outdoor workers along with an increased risk of skin cancer.

⁸³ <https://www.gloucestershireccg.nhs.uk/wp-content/uploads/2019/10/Appendix-3.2-Cotswold-Profile.pdf>

⁸⁴ All-terrain mobility scooters

⁸⁵

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/833726/landscapes-review-final-report.pdf

Warmer temperatures could also increase the risk of vector borne diseases such as Lyme Disease and heavy rainfall events can increase the risk of water borne diseases such as leptospirosis and gastrointestinal infections.⁸⁶

Although the numbers of people affected will be small, an increase of extreme weather events, particularly heavy rainfall leading to flooding may lead to increased casualties and an increase in anxiety and depression

Milder winters and to a greater extent warmer summers will provide encouragement for people to access the high quality landscape, rights of way and the quieter lanes network of the Cotswolds for 'Active Travel' and generally adopt a more active lifestyle. This should lead to benefits of better physical and mental health and wellbeing. Green space with shade in towns and villages and shade along popular recreational routes will become increasingly important.

Aims

The CNL continues to develop as a place that offers opportunities for communities and visitors to improve their health and wellbeing by accessing and interacting with nature and heritage.

Improve people's resilience to the generalised adverse effects of climate change on their physical and mental health

Strategy

	Strategy	Stakeholders
HW1	More fully research and promote the value and availability of access to the Cotswolds for health and wellbeing	CNL Board, NHS, health and wellbeing Boards, NE, HE, NT, managers of heritage and wildlife sites, county volunteer co-ordinators, green gyms and organisations supporting public participation
HW2	Encourage and support the health sector to make greater use of accessing nature and heritage in the Cotswolds e.g., Green Prescriptions	CNL Board, health and wellbeing Boards, NHS
HW3	Engage with communities within and adjacent to the CNL to help them overcome the barriers preventing them from receiving the health benefits of the Cotswolds	CNL Board, NE, community leaders, disability groups, local authorities
HW4	Develop and promote the Guided walks programme to encourage new, non-traditional and hard to reach groups.	CNL Board
HW5	Work with partners to reduce physical barriers to access by expanding the network of 'walks on wheels' and Trumper routes etc.	CNL Board, highway authorities, farmers, landowners
HW6	Promote awareness of ticks and Lyme Disease	PHE, CNL Board, National Trust, wildlife trusts
HW7	Seek to ensure the inclusion of adequate Green and blue	Local authorities, developers

⁸⁶ <https://ehjournal.biomedcentral.com/articles/10.1186/s12940-017-0326-1>

	infrastructure within new development and ensure its design encourages engagement by the local community	
HW8	Provide guidance for planting trees for shade in green spaces, along recreational routes and for outdoor workers.	CNL Board, local authorities, NFU, CLA
HW9	Promote 'Active Travel' as an alternative to the car.	CNL Board, NHS, health and wellbeing Boards, local transport authorities, NE

Appendix 1 AONB Designation and natural beauty

AONB Designation

The Cotswolds AONB was designated in 1966 and extended in area in 1990. At 790 square miles, or 2038 square kilometres, it is the largest AONB and the third largest protected landscape in England.

AONBs are landscapes whose distinctive character and natural beauty are so outstanding that it is in the nation's interest to safeguard them. They have the same landscape status as National Parks.

The statutory purpose of AONB designation is to conserve and enhance their natural beauty. AONBs are designated in law following a prescribed process which includes an objective appraisal of landscape quality, statutory assessments by the national conservation agencies and wide consultation with stakeholders including local landowners, residents and businesses.

Each AONB has been designated by reason of its special qualities. These include the flora, fauna, historical and cultural associations as well as landscape and scenic views.

AONBs exist within a legal framework which has been progressively strengthened since the first AONBs came into existence after the Second World War. The primary, or enabling, legislation for the designation of AONBs was the National Parks and Access to the Countryside Act 1949. The Countryside and Rights of Way (CRoW) Act 2000 subsumed and strengthened the AONB provisions of the 1949 Act. It confirmed the purpose and significance of AONBs, clarified the procedure for their designation, and created a firm legislative basis for their designation, protection and management. The Act also provided for the establishment of Conservation Boards to manage AONBs

Areas of Outstanding National Beauty are part of a family of protected areas recognised and classified by the International Union for the Conservation of Nature (IUCN) throughout the world. IUCN recognises AONBs and National Parks in England and Wales as Category V Protected Landscapes – a protected area managed mainly for landscape protection and recreation.

Natural Beauty

The concept of natural beauty is one of the cornerstones of legislation to protect landscapes in the UK. It has been the basis for the designation of AONBs and National Parks since the 1949 National Parks and Access to the Countryside Act.

Natural beauty goes well beyond scenic or aesthetic value. It encompasses everything that makes an area distinctive: geology, climate, soil, plants, animals, communities, archaeology, buildings, the people who live in it, past and present, and the perceptions of those who visit it. It is widely accepted that natural beauty is, in part, due to human intervention, such as agriculture.

Natural England has developed a list of natural beauty criteria to be used when assessing landscapes for designation as AONBs or National Parks, as outlined in the table below. It is Natural England's view that the practical application of the natural beauty criteria is identical for National Park and AONB designations, despite there being differences in the degree to which the criterion is clarified in the legislation. So, for example, the extent to which wildlife and cultural heritage are factored into natural beauty assessments by Natural England is the same for both AONBs and National Parks. It is also the Government's formal position that the natural beauty required of an AONB and a National Park are the same.

Landscape quality

This is a measure of the physical state or condition of the landscape.

Scenic quality

The extent to which the landscape appeals to the senses (primarily, but not only, the visual senses).

Relative wildness

The degree to which relatively wild character can be perceived in the landscape makes a particular contribution to sense of place.

Relative tranquillity

The degree to which relative tranquillity can be perceived in the landscape.

Natural heritage features

The influence of natural heritage on the perception of the natural beauty of the area. Natural heritage includes flora, fauna, geological and physiographical features.

Cultural heritage

The influence of cultural heritage on the perception of natural beauty of the area and the degree to which associations with particular people, artists, writers or events in history contribute to such perception.

The list is not intended to be exhaustive and other factors may be relevant in some circumstances. Not all factors will be relevant in every case.

Appendix 2 Principles of Regenerative Agriculture

Regenerative Agriculture	
Soil Health Principles Select your management practices based on soil health principles. Those that score highest should be preferred (where practical)	Pasture Health Principles Favour systems & practices that fulfil more of these principles. Let your objectives inform your management choices, not infrastructure
1. Living root – for as long-/as Often as possible. <ul style="list-style-type: none"> • Root exudates feed organisms – they build soil 	1. Stock density – increase <ul style="list-style-type: none"> • On average and the upper maximum
2. Covered Soil – with residues or living plants <ul style="list-style-type: none"> • No bare soil in nature – protected from elements 	2. Grazing event duration – shorten <ul style="list-style-type: none"> • Avoid that second bite!
3. Minimise disturbance/compaction – tillage. <ul style="list-style-type: none"> • Preserves aggregate structure 	3. Rest periods – lengthen <ul style="list-style-type: none"> • Allow full recovery before re-grazing
4. Diversity – in rotations/plantings <ul style="list-style-type: none"> • Diversity above ground feeds diversity below 	4. Utilisation rates – reduce <ul style="list-style-type: none"> • More leaf area facilitates faster growth
5. Feed soils with organic matter (between cropping) <ul style="list-style-type: none"> • Organisms need energy to stay active 	5. Trampling rates – increase <ul style="list-style-type: none"> • Residues protect soil and feed organisms
6. Incorporate animals – ideally adaptive grazed. <ul style="list-style-type: none"> • A grazed cover crop is better than an ungrazed one 	6. Paddock shape/proportion – adapt <ul style="list-style-type: none"> • Ensure even utilization across the cell/paddock
7. Minimise use of chemicals <ul style="list-style-type: none"> • Undoes all your previous work 	7. Swards composition – diversify <ul style="list-style-type: none"> • Overseed pasture plants, annual forages & cereals. Bale graze
	8. Plan, observe, monitor & record <ul style="list-style-type: none"> • Track your progress, measure your success

Appendix 3 Habitat targets to achieve by 2050 in the Cotswolds NRP

Habitat	Current extent hectares/% of CNL	Target hectares/% of CNL
Arable in agri-environment/SFI	38,041ha/19%	107,081ha/53%
Species rich limestone grassland	3,031ha/1%	14,699ha/7%
Species rich grassland – other including neutral and floodplain	2,991ha/1%	8,823ha/4%
Wetlands	329ha/<1%	1,974ha/1%
Hedgerows	6,372ha/3%	7,010ha/3%
Mosaic grassland/tree/scrub	10,387ha/5%	20,773ha/10%
Woodland *	24,422ha/12%	28,573ha/14%

**The woodland figures vary from some other sources because pasture woodland and similar partly wooded mosaic habitats have been allocated to their own separate category of habitat.*

For full Cotswolds National Landscape Nature Recovery Plan –

<https://www.cotswoldsaonb.org.uk/looking-after/cotswolds-nature-recovery-plan/>