



Essex Highways Decarbonisation Strategy

2024

Essex County Council Essex Highways Decarbonisation Strategy

Foreword- *driving net zero behaviours and decisions.*

We recognise the vital role that the highways network plays in the lives of residents as well as the travelling public and local businesses, especially as the county strives to respond to the cost-of-living crisis and other global issues.

While we celebrate the benefits of our transport network in providing movement for people, goods, and services essential to support our way of life and plans for prosperity, however, we also acknowledge its potential to impact negatively on the environment.

This Essex County Council Essex Highways Decarbonisation Strategy, along with the Essex County Council Essex Highways Strategy for managing its Green Estate, is at the heart of the Council's environmental planning for its Highways assets.

This Strategy acknowledges how urgent actions are now needed to address climate change, not only to reduce the Council's carbon footprint but also to improve green infrastructure and biodiversity, help restore local nature, and alleviate flood risk but also manage water resources better.

This Strategy sets out how the environment is a key consideration in all Highway related decision making, thereby supporting the Council's strategic priorities documented in Everyone's Essex, as well as promoting the Council's vision for 'Safer, Greener and Healthier Travel', and contributing towards achieving the [County's target of net zero by 2050](#).

Cllr. Tom Cunningham



Portfolio Holder for Highways, Infrastructure and Sustainable Transport

Essex Highways' assets are currently managed via the Essex Highways strategic partnership, which is a collaboration between ECC and contractor Ringway Jacobs, which was formed on the 1st of April 2012.

This Strategy is a supplementary strategic document to the Highways Infrastructure Asset Management Plan (HIAMP) which forms the keystone of the Essex Highways Strategic Partnership whose objective is to deliver the Council's strategic priorities. This Strategic Partnership makes us very flexible and adaptive to change – such as the need to respond to the current environmental challenges. It also positions us well to realise the potential benefits from the Council's emerging plans relating to devolution.

Both Essex County Council and Ringway Jacobs are committed to exploring the opportunities presented through this Strategy for reducing the Council's carbon footprint as well as for improving other aspects of the environment. At the same time, the partnership remains committed to long term efficient and cost-effective management of Highways' assets, to deliver a transport system that supports sustainable economic growth and promotes the very best quality of life for the residents of Essex.



Tom Blackburne-Maze
Director Highways and Transport



Simon Butt
Operations Director

Contents	Page Number
1. Summary	1-6
2. Context - Objectives of Strategy	7
2.1 Net Zero by 2050	7
2.2 'Everyone's Essex, our plan for levelling up the county, 2021-25'	7
2.3 The Essex Highways Strategic Partnership– supporting the ECC Vision for 'Safer, Greener and Healthier Travel'	8
2.4 The Local Transport Plan	9
2.5 The Department for Transport (DfT): Financial Incentives to Local Authorities who address climate change.	9-10
2.6 Supporting improvements to Green Infrastructure, Biodiversity, Flood Alleviation, and Local Nature Recovery, and better management of Water Resources	10
2.7 United Nations Sustainability Development Goals, and Essex Social Value	10-11
3. The Essex Highways Decarbonisation Strategy: Scope	11-12
4. Carbon Emissions Assessment: establishing a base line(s) and setting targets for reduction	12-13
4.1 Setting Carbon Emissions Baselines	13-14
4.2 Setting Carbon Emissions Reduction Targets	14-15
5. Asset Management Planning	15-16
5.1 PAS2080 Carbon Management Process, and the Circular Economy	16-18
5.2: Climate Change: the need for Climate Resilient Infrastructure	18-19
5.3 Asset Management: Lifecycle Planning	19-20
6. Unifying a collaborative commitment to net zero ambitions	20
6.1 A programme of communications organisation wide and beyond	20-21

7.	Tackling Decarbonisation at the Design Stage	21
8.	Plant and Fleet	22
9.	Energy, Offices and Operational Depots	23-24
10.	Low Carbon Emissions Materials for Highway Work	24-25
11.	Reducing Wastage, and Recycling	25-26
12.	Procurement and Supply Chain	27
13.	Maintenance and Construction	27-28
14.	Developer Guidance	28-29
15.	Reducing Road User Demand	29-30
16.	Air Quality – The Essex Air Consortium	30-31
17.	‘Insetting’ and ‘Offsetting’ CO2e through Tree Management	32-33
18.	Improving Green Infrastructure, Local Nature Recovery, Flood Alleviation, 33 and Biodiversity, and Better Management of Water Resources.	
18.1	Improving Green Infrastructure, restoring Local Nature	34
18.2	Biodiversity Duty	34
18.3	Biodiversity Net Gain	34
18.4	Water Management	34-35
19.	Social Value	35
20.	Risk	35-36
21.	Performance Review and a Culture of Continuous Improvement	36
	Appendix A: Climate Action Activity and Timeline	37-54
	Glossary	55-58

1. Summary

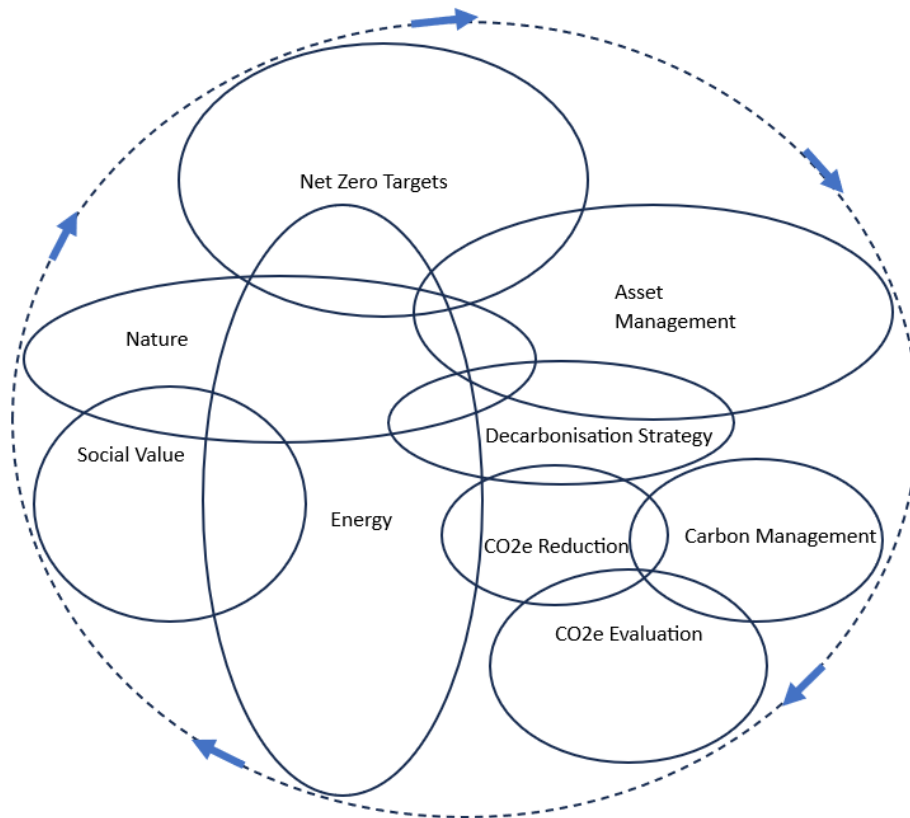
Essex County Council (ECC) owns a vast network of highway infrastructure assets. The way in which ECC Essex Highways (Highways) creates, maintains, and replaces these assets, has the potential for a significant impact on the volume of carbon emissions produced annually. Highways has an important role to play, therefore, in supporting: the Council's net zero targets; the environmental priorities detailed in 'Everyone's Essex'; the climate action themes in the emerging Local Transport Plan(4), and ECC's vision for 'Safer, Greener and Healthier Travel'.

While Highways is already contributing to carbon emissions reduction, its net zero journey has only recently commenced, therefore the principles of carbon management are not yet embedded fully into its practices. This Strategy, therefore, largely sets out the investigations Highways will undertake to identify and implement opportunities for carbon emissions reduction, rather than list a definitive suite of established measures. A summary of the key investigative activities is listed in Chart 2 below, but for a comprehensive list of activities please refer to Appendix A: Climate Action Activity and Timeline, pages 36 to 53.

The financial challenges faced by the Council are not underestimated, however. This Strategy, therefore, does not commit the Council to any expenditure now or in the future. Where opportunities for carbon emissions reduction would create additional costs, especially maintenance costs, these will be the subject of business cases that clearly set out the environmental benefits and financial costs. These business cases will be employed in the first instance to explore fully the possibility of acquiring external funding and resource. Where external funding and resource cannot be acquired, however, the business cases will be submitted to ECC to determine if members wish to provide support. There will NOT be a presumption, however, that funding and resource will be forthcoming.

This Strategy also acknowledges the complex interdependencies and synergies between carbon management and nature, however. Some of these relationships are shown in Chart 1 below, although this chart is not a definitive picture of all relationships. It therefore also sets out how Highways will explore its green estate and environmental maintenance with a view to contributing to improvements for green infrastructure, biodiversity, and flood alleviation, as well as better management of our water resources. All of which will assist local nature recovery as well as promote health and wellbeing for all and add positive social value. For more detailed information on these matters, however, please refer to the Essex County Council Essex Highways Strategy for managing its Green Estate.

Chart 1.



For Chart 2, Part 1 of 4 please refer below:

Chart 2, Part 1 of 4

ECC Essex Highways Decarbonisation Strategy			
Exploring opportunities to support the Council's ambitions to be Net Zero by 2050			
Category	Highway Activity	Climate Action Activity Description	Timeline
Developing a Decarbonisation Culture	Communications	➔ Implement a programme of communications to sustain a culture of Environmental Sustainability awareness	ongoing
		➔ Develop Environmental Sustainability web pages to communicate progress and celebrate successes	2024/25
Maintenance and Construction Emissions	Procurement	➔ Encourage suppliers to provide information on the embedded carbon of their materials and services	2024/25
		➔ Purchase more sustainable and efficient products and services	2024/25
		➔ Work collaboratively with the Supply Chain to develop net zero plans for key construction materials and services	2025/26
		➔ Consider more local suppliers within current contractual framework, to reduce transport emissions	2024/25
	Design	➔ Identify and implement a programme of detailed training in environmental sustainability for designers	Ongoing
		➔ Design managers to develop a culture that supports and encourages design and technological innovation that drives all aspects of decarbonisation	Ongoing
		➔ Designers to identify opportunities to set limits upon the amount of carbon emissions that can be produced during the execution of the works	2025/26
		➔ Designers to include the ongoing need for climate resilience in their planning	Ongoing
	Maintenance and Construction Emissions	➔ Progress opportunities to extend use of warm mix	Ongoing
		➔ Trial innovative low carbon alternative materials and implement where viable	Ongoing
		➔ Investigate opportunities to extend use of recycled aggregate	Ongoing
		➔ Work collaboratively with Designers to determine lower carbon emissions outcomes	Ongoing
		➔ Explore potential for reducing emissions from construction on our sites	2024/25
		➔ Work with our supply chain to trial net zero emission plant on our schemes	2024/25
		➔ Investigate the opportunity for undertaking a net zero trial scheme	2024/25
		➔ Move to a position where we are selecting materials based on the benefits of their whole life carbon emissions	2025/26
		➔ Determine a waste management plan for every scheme	2024/25

Chart 2, Part 2 of 4

Category	Highway Activity	Climate Action Activity Description	Timeline
Organisation Emissions	Waste Management	➔ Continue to progress opportunities for reusing removed road material	Ongoing
		➔ Aspire to more challenging recycling targets to reduce use of new material	2024/25
		➔ Explore reuse of components removed from sites, and implement where practicable	Ongoing
		➔ Reduce use of paper	Ongoing
		➔ Estimate material requirements more accurately to minimise wastage	Ongoing
		➔ Extend trial use of 'hot boxes' to keep materials warm to minimise wastage, and implement where practicable	2024/25
		➔ Continue to support a ban for single use plastics	Ongoing
		➔ Mandate suppliers to take back shrink wrap and packaging for reuse	Ongoing
		➔ Determine a waste management plan for every office and depot	2025/26
	Energy	➔ 100% of street lights to be converted to L.E.D.	2023/24-2024/25
		➔ Investigate energy sources for premises and assets and, for those not on 100% renewable energy contracts, move to 100% energy as soon as practicable	Ongoing
		➔ Continue to operate part-night lighting	Ongoing
		➔ Upgrade Traffic Management Systems High Intensity Lamps to L.E.D.	2023/24-2025/26
		➔ Convert Traffic Management equipment to extra low voltage where practicable	Ongoing
		➔ Reduce energy use in offices and operational depots	Ongoing
		➔ Investigate potential for phasing out gas heating	2025/26
		➔ Investigate potential to move to battery powered hand tools	2024/25
		➔ Explore viability of generating and storing own energy on site	2025/26
		➔ Continue to progress opportunities to install solar panels at operational depots	Ongoing
		➔ Investigate potential for solar powered or solar/hybrid powered generators to provide energy for site lighting, signage, Close Circuit Television (CCTV) and welfare facilities	2024/25
		➔ Investigate opportunities to extend current use of road side solar power - not just for assets but wider applications	2025/26
		➔ Investigate potential for installing piezoelectric crystals within road network to convert traffic vibrations to energy	2026/27
		➔ Progress opportunities to replace energy intensive goods and services with low energy goods and services	Ongoing
		➔ Continue to support home working, to provide opportunities to reduce office space	Ongoing

Chart 2, Part 3 of 4

Category	Highway Activity	Climate Action Activity Description	Timeline
Organisation Emissions	Plant and Fleet	Continue to progress opportunities to convert fleet vehicles to 100% electric.	Ongoing
		Investigate potential for converting larger vehicles to Hydrogen fuel or HVO or Biofuel	2025/26
		Investigate potential for taking part in central government trial use of Hydrogen for larger vehicles, and implement if viable	2025/26
		Promote the need for installing additional Electric Vehicle Charging points on the network	Ongoing
		Explore potential for wireless charging for electric vehicles	Ongoing
Reducing Road User Demand	Road Use Demand	Continue to promote sustainable transport and active travel to reduce congestion and reduce emissions	Ongoing
		Investigate potential for including active travel routes in winter maintenance to make routes less hazardous in sub-zero temperatures	2025/26
		Continue to promote 'destination shifting', working from home or using local shops, to reduce travel	Ongoing
		Explore potential for increasing capacity on network by undertaking system wide network review to improve efficiency of traffic movements	2025/26
		Support investigations for connected and autonomous vehicles	Ongoing
Nature	Managing Green Estate	Set out and agree with ECC a strategy for how we will manage our highways green estate	2024/25
		Continue to support the Green Streets initiative relating to tree planting	Ongoing
		Investigate potential to encourage wildflower growth through reviewing our grass cutting schedule	2025/26
		Investigate potential for installing amphibian ladders in gullies as well as installing other equipment to assist safe wildlife movement, at key locations	2025/26
		Continue to review requirement for otter shelves on Structures, and implement where practicable	2025/26
		Investigate the potential for managing surface water through the installation of 'rain gardens' or other sustainable drainage solutions (SUDS)	2025/26
		Investigate the potential for the creation of 'green bridges' to link green infrastructure	2025/26
	Water Management	Measure water usage and set targets for reduction	2025/26
		Consider the feasibility of options for grey and rainwater recycling	2025/26
		Consider the reuse of water from Sustainable Urban Drainage Systems (SUDS)	2025/26
		Investigate the opportunity to retrofit Sustainable Drainage Systems (SUDS) to reduce impact on drainage infrastructure	Ongoing
		Explore retaining surface water so that it can be released slowly back into the environment	2025/26

Chart 2, Part 4 of 4

Category	Highway Activity	Climate Action Activity Description	Timeline
Emissions Measurement	Baselining Carbon Emissions	➔ Explore Tools for measuring Carbon Emissions	Ongoing
		➔ Continue to measure Scope 1 and Scope 2 emissions	Ongoing
		➔ Continue to explore means of measuring Scope 3 emissions, and implement where practicable	Ongoing
		➔ Review all highway related activities to identify whole life carbon emissions reduction opportunities, and implement where practicable and affordable	Ongoing
	Setting Carbon Emissions Reduction Targets	➔ Agree the setting of Key Performance Indicators (KPIs) relating to carbon emissions reduction	2025/26
		➔ Measure and monitor progress to meeting Carbon Emissions Reduction Targets, and work collaboratively to address variances	2025/26
		➔ Report carbon emissions outcomes in an open and transparent manner	2024/25
Asset Management Planning	Asset Management Planning	➔ Include Whole Life carbon emissions modelling in the lifecycle modelling across all major assets where applicable	2024/25
		➔ Include impact on carbon emissions when drafting business cases for investment	2024/25
		➔ Include carbon emissions reduction risk in the Asset Management Strategic and Tactical Risk Review and reporting process.	Ongoing
		➔ Continue to explore the deployment of survey drones for structures inspections	Ongoing
		➔ Continue to explore opportunities to undertake routine, safety inspections for roads, footways and cycleways using artificial intelligence (AI)	Ongoing
Social Value	Social Value	➔ Measure social value associated with highway related activities	2025/26
		➔ Agree and set Social Value improvement targets	2025/26

2. Context – Objectives of Strategy

This Strategy sets out Highways' approach to decarbonisation to Essex residents – largely an investigative led approach at this stage - but it also serves as a detailed decarbonisation reference document for Highways' staff. This Strategy should not be read in isolation but in conjunction with 'Appendix A: Climate Action Activity and Timeline', which details activities to address climate change, together with their timeline for completion. The activities have not been prioritised, as priorities will be influenced by what is practicable, achievable, and affordable. For example, should highest priority be for energy to be from 100% renewable sources, or should it be for generation of onsite renewable energy to be used with battery storage, or to convert the Essex Highways vehicle fleet to electric? Priorities will be identified through the investigative approach. Activities will therefore be prioritised in due course and will be reflected in future iterations of this Strategy.

2.1 Net Zero by 2050

Recently, there has been heightened awareness in political and public perception of the impacts from climate change and environmental decline. The urgency for action has been universally agreed with the COP21 Paris Agreement, and the UK is the first country to enshrine in law a commitment to reducing greenhouse gas emissions to net zero by 2050.

The Essex Climate Action Commission publication ['Net Zero, making Essex carbon neutral'](#) states that to achieve net zero ambitions it will take the collective endeavours of everyone in Essex: Essex County Council (ECC), District, Borough, City, Town, and Parish Councils, and our public and private sector partners as well as our residents.

This Strategy supports the Council's net zero ambitions. Its purpose is to enable a strong carbon emissions culture to be developed, such that carbon emissions will soon become a key part of every decision it takes going forward. This Strategy will also be a key reference document for Highways' staff as they progress their net zero journey.

2.2 'Everyone's Essex, our plan for levelling up the county, 2021-25'

The document 'Everyone's Essex, our plan for levelling up the county, 2021-25' sets out the Council's twenty strategic priorities that will make Essex a stronger county, not just for us, but also for our children and their children. These priorities fall into four categories: Economy, Environment, Health, and Family. Under the Environment category, the Council pledges to work to hit our net zero targets, by ensuring the council significantly reduces its carbon footprint. To support the move towards net zero, the Council also pledges to deliver a step change in sustainable travel across the county, by growing passenger transport and active travel. This Strategy sets out how Highways will support these priorities and pledges.

2.3 The Essex Highways Strategic Partnership – supporting the ECC Vision for ‘Safer, Greener and Healthier Travel’.

ECC owns and maintains a vast network of highways and transportation assets: over 5,000 miles of roads, together with a footway network of 4,000 miles, and 4,000 miles of Public Rights of Way. In addition, there are over 1,500 bridges and other highway structures, over 130,000 streetlights, 11,700 illuminated signs, 1,900 beacons and wall lights, and over 2,700 lit bollards, and over 500 Traffic Signals and Crossings. There are also other asset groups such as cycle tracks, highway gullies and drains, vehicle restraint systems, traffic signs, passenger transport infrastructure and bus telematics.

These assets are currently managed via the Essex Highways strategic partnership which is a collaboration between ECC and contractor Ringway Jacobs. (The exception to this is passenger transport and bus telematics infrastructure which is managed wholly by ECC).

The strategic partnership contract was established via the Highways Strategic Transformation, and commenced on the 1st April 2012 and is due to end at the close of financial year 2026/27. The future of the Highways Service beyond this date is the subject of a new strategic transformation currently underway. While carbon emissions management was not a key consideration of the original strategic partnership, Highways recognises the urgency of tackling climate change and is acting now, rather than waiting until commencement of new highway service arrangements.

The Highway Infrastructure Network will still be required in 2050 and beyond, and its vastness of assets assures the requirement for a significant volume of works and related activities for it to be maintained. Given that this infrastructure was largely built in periods when carbon emissions was not a priority consideration, to a large degree we are ‘locked in’ to maintenance and renewals activities associated with the potential for high carbon emissions outputs. Similarly, the highways assets historically created by developers and subsequently adopted by Highways, also has relevance.

It is also worth noting that the volume of works and related activities required to maintain the highway network will be influenced by the ongoing condition and age of the assets, as well as availability of investment. These latter points are significant, as even when the implementation of this Strategy is well developed, the annual outturn of carbon emissions may not always reflect overall system wide reductions, rather the avoidance of carbon emissions through improvements in practices.

Highways, therefore, has an important role to play in implementing a Strategy that strives continuously to reduce the Council’s carbon footprint. While the challenge to minimise carbon emissions costs should not be underestimated, however, this Strategy sets out Highways’ plans for decarbonisation, in keeping with the Council’s vision for ‘Safer, Greener and Healthier Travel’ for current and future users of the transport network.

2.4 The Local Transport Plan

Transport is a significant source of carbon emissions. In the Eastern Region (Essex, Norfolk, Suffolk, Southend-On-Sea, and Thurrock) transport accounts for 42% of the total carbon emissions annually, and the vast majority of this is from road travel.

The Local Transport Plan (LTP) is the most strategically important transport plan produced by the Council. The LTP sets out the Council's aspirations for improving travel in the county, demonstrating the importance of meeting these aspirations to achieving sustainable long-term economic growth in Essex and enriching the lives of our residents. To enable delivery of this vision, the LTP contains a suite of 15 transport policies that apply throughout Essex. Policy 7 sets out how the Council will support and encourage the use of low carbon travel.

The current LTP, which is the third iteration of this strategy, was drafted in 2011 and covers a 15-year period. In August 2022, an Essex Transport Policy Note was published as an addendum to the LTP. This stated the position of ECC regarding decarbonisation of transport, with reference made to proposed development of the policy to support the transition to sustainable zero carbon transport. The note also stated the adoption of ECC's 'Safer, Greener and Healthier Travel' vision, as well as its support for the Essex Climate Action Commission's Report: 'Net Zero, Making Essex Carbon Neutral'.

A revised LTP(4) is currently being drafted and is expected to be published in late 2024, although this date could change subject to central government guidance. It will replace LTP(3), and it will be evidence led and focussed upon the delivery of strategic themes linked to the delivery of wider Essex and Government priorities. Decarbonisation is one of the four strategic themes. This ECC Essex Highways Decarbonisation Strategy directly supports the LTP, through its plans to reduce carbon emissions associated with infrastructure asset maintenance and replacement, as well as through its broader plans to address climate change through nature-based solutions where practicable and affordable.

2.5 The Department for Transport (DfT): potential financial incentives to Local Authorities who address environmental challenges.

The DfT Incentive Fund, which provided financial incentives to Local Authorities who could evidence sound asset management practices, was an initiative implemented by the DfT between 2015/16 to 2020/21. It is not currently clear whether the DfT is preparing to rehabilitate the Incentive Fund in a different format. However, in its final years, the Incentive Fund expanded to include collation of information relating to environmental sustainability. It is reasonable, therefore, to conclude that going forward the DfT will expect plans for carbon emissions reduction as well as plans for other climate action activities such as management of Green Estate, to be included within the asset management plans for Local Authorities. This Strategy therefore places ECC in a favourable position for evidencing continued sound

asset management practices, thereby safeguarding any future Incentivised Funding from the DfT.

There is also evidence that the DfT is placing significant emphasis on business cases that address environmental challenges, therefore this Strategy will contribute to supporting bids to the DfT and other organisations for additional funding.

2.6 Supporting improvements to Green Infrastructure, Biodiversity, Flood Alleviation, and Local Nature Recovery, and better management of Water Resources.

While this Strategy will primarily focus on carbon emissions reduction, it also recognises the complex interdependencies and synergies between carbon management and nature. In view of this, opportunities to implement nature-based solutions to absorb carbon emissions through ‘insetting’ and ‘offsetting’ will also be explored. The publication ‘Net Zero: making Essex Carbon Neutral by 2050’, by the Essex Climate Action Commission, states: “The natural world is our best ally in reversing climate change – it is key to absorbing and storing carbon.”

This Strategy therefore also includes the Highways’ approach (in summary only) to exploring opportunities to improving green infrastructure, biodiversity, and flood alleviation, as well as better management of water resources – all of which will help local nature recovery and promote health and wellbeing for all and add positive social value. These are referenced in this Strategy and included in the activities detailed in ‘Appendix A: Climate Action Activity and Timeline’.

It is recommended that carbon emissions reduction and nature are investigated simultaneously, as they go together, rather than each in isolation. However, for more information on matters relating to nature and water management please refer to ‘Essex County Council Essex Highways Strategy for managing its Green Estate’.

2.7 United Nations Sustainability Development Goals, and Essex Social Value

The United Nations Department of Economic and Social Affairs, 2030 agenda for sustainable development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by all countries - developed and developing - in a global partnership. They recognise that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

Social value is defined through the Public Services (Social Value) Act 2012 which came into force in January 2013 and requires all public sector organisations (and their suppliers) to look beyond the financial cost of a contract and consider how the services they commission and procure might improve the economic, social, and environmental well-being of an area.

The perspective of Essex County Council is that social value is the view beyond price that looks at the additional value organisations can bring to our communities, and it works with its suppliers to produce wider benefits for Essex.

The ECC Essex Highways Decarbonisation Strategy will support all forms of social value.

3. The Essex Highways Decarbonisation Strategy: Scope

This Strategy is a supplementary strategic document to the Highways Infrastructure Asset Management Plan (HIAMP) which also includes the ECC Highways and Transportation Asset Management Policy and ECC Highways and Transportation Asset Management Strategy, among other supplementary strategic documents.

This Strategy includes the maintenance and replacement of existing and new highway infrastructure assets using capital and revenue funding for programmed and reactive work streams, as well as environmental maintenance and inspections activities. Its focus is on 'whole life' carbon emissions management that seeks to minimise carbon emissions over the life of the asset, as opposed to quick fixes that may reduce carbon emissions in the short term but ultimately result in higher carbon emissions in the future. It also includes references to nature-based solutions and circular economy principles.

This Strategy does not include the management of carbon emissions in major highways construction projects such as the construction of a new bypass. It is anticipated, however, that such construction projects will be subject to a carbon management process that will seek to minimise carbon emissions from the asset management and design stages, through to completion and subsequent whole life maintenance as well as replacement at end of life.

Neither does this Strategy refer to the management of carbon emissions reduction by developers, as this matter is detailed in the Essex Design Guide which is published on the ECC website.

A key component of this Strategy is reducing demand on highway infrastructure assets, through the promotion of sustainable transport and active travel, including the promotion of new, active travel schemes. The corresponding impact on traffic reduction will improve air quality which will have a positive impact on peoples' health. It will also facilitate health benefits from exercise associated with active travel such as walking and cycling.

This Strategy provides an indication of our requirement to make infrastructure more resilient to climate change, since although the UK is committed to reducing its carbon emissions in alignment with the goals of the Paris Agreement, global emissions trends are currently set to

result in greater temperature rises. We therefore need to understand the potential climate change effects of rising temperatures and to respond accordingly when determining the resilience of our highways and transportation infrastructure, particularly when designing new construction. In this regard, it is acknowledged that the effects of climate change will likely be a sustained challenge for future generations.

While climate change adaptation will be essential if the Council's net zero ambitions are to be realised, however, climate change adaptation is viewed as a separate matter to decarbonisation and will be treated separately in strategic asset management plans going forward.

It should also be noted that the challenges presented by climate change have only relatively recently been acknowledged and even more recently started to be addressed by Local Authorities. While we are confident of positive progress through systematically reviewing our activities to take direct action, we do not yet have all the answers. To some degree, we must wait for innovators within industry to present to us their solutions for required low carbon materials and processes.

This Strategy, therefore, reflects work in progress, and will be revisited and revised at regular intervals to detail positive carbon management developments which we anticipate will be realised over time.

4. Carbon Emissions Assessment: establishing a base line(s) and setting targets for reduction.

An effective Decarbonisation Strategy requires a detailed understanding of the organisation's greenhouse gas emissions:

Scope 1: Co2e from the organisation's facilities and vehicles (direct emissions from owned or controlled sources).

Scope 2: Co2e from purchased electricity (indirect emissions from the generation of purchased electricity, steam, heating, and cooling consumed by the organisation).

Scope 3: includes employee commuting as well as all indirect emissions that occur in a company's supply chain.

Table 1 below shows the annual Carbon Emissions (tCO2e) outturns for ECC Essex Highways Scope 1 and Scope 2 emissions, from 2020.

Table 1

	Essex Highways tCO2e		
Year	2020	2021	2022
Scope 1	1663	1683	1514
Scope 2	71	63	59
Scope 3			
Total	1734	1746	1573

Our calculations for Scope 1 and Scope 2 emissions for Highways are already well developed, but the process for calculating Scope 3 is currently in progress and is highlighted as a higher priority task.

4.1 Setting Carbon Emissions Baselines

A baseline measure of each Scope must be calculated so that carbon emissions reduction targets can be determined, with the view of measuring performance against targets so the effectiveness of this Strategy can be assessed and developed. The processes for calculating carbon emissions will follow the Greenhouse Gas Protocol (GHG) Guidance or similar industry standard.

It is recognised that a measure for Scope 3 is the most challenging to calculate, as this will require collating information from the supply chain, whose awareness of the embodied Co2e within their materials and processes, as well as the effectiveness of their current carbon management systems, may not universally be well developed.

Where additional data is requested from suppliers, this has the potential to result in higher supply chain costs for materials and processes. Procurement incentives to support carbon emissions reduction will be considered, but it is not currently clear where offering incentives to the supply chain will be permissible or viable within the existing Essex Highways contractual arrangements. However, the potential will be investigated fully and implemented where there are clear benefits to all parties.

Where the supply chain is not able to provide adequate information, carbon emissions will be estimated in accordance with UK Government GHG Conversion Factors for Company Reporting, which are updated annually. For example, in the case of procured materials from the supply chain, the tonnes of material procured will be multiplied by the relevant conversion factor to estimate the carbon emissions for each supply chain company, then aggregated up to reflect a system wide outturn. Note that such estimates will only be used where a supply chain company is unable to provide information to the required level of accuracy. Since source records relating to volumes of materials procured will be held on file, historic estimates for carbon emissions can be revisited and superseded over time when more accurate information is available.

There is a Highways project currently in progress to develop its procurement system to estimate Scope 3 supply chain emissions using the Government GHG Conversion Factors for each material and service procured. This project is now approaching 'go live'.

Given that work relating to the calculation of Scope 3 emissions is ongoing, it may be some while before a system wide Scope 3 base line and corresponding improvement target can be set. In view of this, a systematic approach will be taken to building up a system wide baseline by identifying and collating baseline information relating to the individual Scope 3 processes and materials as these become known. This will enable the calculations of reductions in

carbon emissions to be built up over time, prioritising high emissions ('hot spots') materials and services where practicable. Care will be taken, however, to undertake a holistic approach wherever possible, not to focus on individual activities such that they could result in higher whole life carbon emissions costs for other parts of the service in the future.

Building up Scope 3 emissions data will be achieved through the systematic assessment of different activities as well as the different stages within these activities. For example, the annual capital road resurfacing programme is believed to be a 'hot spot', and a detailed carbon emissions calculation of the capital road resurfacing programme for 2022/23 revealed an estimated outturn of 7,262 tonnes of Co2e. This calculation included the embodied carbon of the material, excavation of surface material, activities relating to transportation of material to and from site, laying the resurfacing material, and management of waste. Similarly, the estimated carbon emissions outturn for the capital footway resurfacing programme in 2022/23 was 1,508 tonnes.

Capital programme activities are generally carried out by our Supply Chain and are therefore categorised as Scope 3 emissions, but the capital road and footway resurfacing programmes are among many capital delivery programmes and therefore do not represent the entire Scope 3 outturns. However, when these figures for roads and footways are compared to the 1,573 tonnes of Co2e for our combined Scope 1 and Scope 2 carbon emissions calculations for 2022/23, as detailed in Table 1 above, it can be seen why Scope 3 emissions are viewed as the most salient and most challenging. To provide context, the Co2e outturns for the entire County, all sources, is estimated at approximately 8mt annually.

One aspect of carbon emissions which may be problematic to measure will be the impact of highway works on the behaviour of others; i.e. traffic diversions and congestion may result in increased carbon emissions from transport. 'Geoplace' is currently developing a carbon emissions calculator for Street Works, a system that manages contractor requests to undertake work in the highway (permission to occupy road space must be requested from the Local Authority that maintains the road in question). It is anticipated that the Street Works Carbon Emissions Measurement Tool when available will include the impact of traffic management measures relating to highway works.

4.2 Setting Carbon Emissions Reduction Targets

This Strategy is a practicable plan to reduce all Scopes of carbon emissions through effective asset management planning, by setting out our commitment towards decarbonisation of all highways related activities. It details an action plan for the short, mid, and longer terms that will contribute to the realisation of the Council's carbon emissions reduction ambitions.

Plans to reduce carbon emissions will be based on PAS2080 guidance, which supports the transition to a net zero carbon economy by 2050, through outlining the processes and methodology involved in calculating and reducing whole-life carbon cost (see 5.1 PAS2080 Carbon Management Process, and the Circular Economy below, for more information).

However, any similar, recognised industry standard guidance approach will also be permissible.

The setting of carbon emissions reduction targets will be essential to measuring the effectiveness of this Strategy as well as determining the development of this Strategy going forward. There is already a comprehensive Essex Highways contract performance management framework that is based on the priorities of the Council (Everyone's Essex). While the setting of carbon emissions reduction targets has not yet been agreed for the Essex Highways contract, it is acknowledged that ECC will expect Essex Highways performance targets to align with ECC ambitions as Essex Highways carbon reduction performance maturity develops over time.

Reducing carbon emissions, fundamentally requires close collaboration across all organisations and all personnel involved in creating, operating, and managing assets and networks (the 'value chain'), to encourage design and technological innovation that drive decarbonisation. This close collaboration can only be established when everyone is aware of the issues, agrees with the objectives, and is committed to achieving them within documented timescales. This includes our supply chain organisations.

This Strategy promotes early engagement, efficient communication, and appropriate training – all of which are essential for establishing an effective system wide collaborative culture. This Strategy also supports the drive for appropriate allocation of human resources and investment to deliver the implementation of carbon management processes.

This will be driven by reviewing all work stream activities – as well as the facilities that support them - which have a carbon emissions impact, putting processes in place to assess and record GHG emissions, identifying whole life carbon reduction opportunities and implementing them where practicable and affordable. All decisions that have a significant impact on carbon emissions management will be agreed by senior managers in Essex Highways before being implemented. In some cases, where the decision increases financial cost or has bearing on terms within the Essex Highways Strategic Partnership, this will also require liaison with ECC Highways Commissioning and possibly also senior managers in the supply chain. There will NOT be a presumption that there will be a positive outcome for decisions which would result in increased costs.

This Strategy rewards efforts that drive down carbon emissions, not only in our own organisation but in supply chain organisations, through including the inclusion of environmental sustainability in the Essex Highways recognition awards.

5. Asset Management Planning

The ECC Essex Highways Asset Management process is fundamental to achieving the Council's decarbonisation ambitions. It sets out the strategy relating to planned, reactive and preventative maintenance, including frequency of safety inspections and associated investigatory levels and repair priorities. It also explores new materials and processes that

inform material choices and design solutions. In addition, it manages strategic and tactical risk and strives to achieve a value for money whole life cost approach.

This Strategy is promoting active travel to reduce demand on our road network and to promote health benefits, but to support this approach we need to ensure our active travel infrastructure is convenient to use in all types of weather. This will require efficient and resilient drainage solutions and may also require precautionary salting to make routes less hazardous in sub-zero temperatures. These potential requirements could have an impact on highway maintenance activities.

The costs and benefits of climate adaptation will be integrated into asset management planning, investment strategies, and decision-making. For example, this Strategy extends lifecycle planning to include whole life carbon emissions costs, and it extends Asset Management Strategic and Tactical Risks to include climate action risks. It will also accommodate the collation of carbon emissions savings opportunities that where practicable will inform business cases. In the first instance, these business cases will be used to explore fully the possibility of external funding opportunities. Where external funding is not acquired, they will be submitted to ECC for the consideration of members. There will NOT be a presumption, however, that investment will be forthcoming.

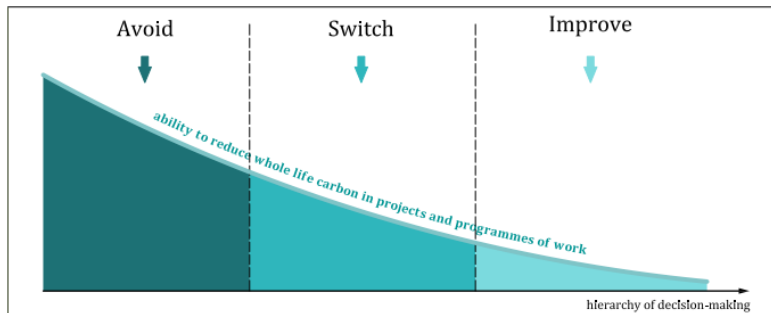
This Strategy also commits to the exploration of nature-based solutions for climate change adaptation measures. This approach has the potential to support the role of the Council in providing valuable habitats for wildlife as well as accessible green spaces for promoting wellbeing. Improving physical and mental wellbeing, and therefore improving social value, are key outcome benefits that are also salient objectives of the emerging LTP(4).

5.1 PAS2080 Carbon Management Process, and the Circular Economy

The majority of the highway infrastructure assets was created at a time when whole life carbon emissions was not a priority consideration. The degree to which retrofitting or systematic changes to materials, processes, and activities, can be used to establish decarbonisation is not yet known fully. However, this Strategy represents a pledge by the Council, to reduce whole life carbon emissions from all highways related activities as far as practicable and affordable, based on the PAS2080 methodology guidance, which will be adapted to the context of highway activities and support facilities.

This Strategy specifically recommends that carbon emissions reduction management follows the PAS2080 hierarchy ‘avoid, switch, improve’ – see below. However, any similar, recognised industry standard guidance approach will also be permissible.

Figure 5 – Carbon reduction hierarchy



In summary:

- 1) **avoid**: align the outcomes of the project and/or programme of work with the net zero transition at the system level and evaluate the basic need at the asset and/or network level.
- 2) **switch**: assess alternative solutions and then adopt one that reduces whole life emissions through alternative scope, design approach, materials, technologies for operational carbon reduction, among others, while satisfying the whole life performance requirements.
- 3) **improve**: identify and adopt solutions and techniques that improve the use of resources and design life of an asset/network, including applying circular economy principles to assess materials/products in terms of their potential for reuse or recycling after end of life.

For more detailed information, please refer to PAS2080.

Note that improving design life in terms of extending service life in a cost-effective manner, is a core objective of effective asset management planning, and will reduce whole life carbon cost through reducing the frequency the asset or component in question requires to be renewed.

When determining whole life carbon emissions costs of activities and schemes, all stages of the proposed asset life will be considered from design stage, through to operation and end of life. When assets are removed but not replaced, there will also be a quantity of carbon emissions from annual maintenance and inspection eliminated that can be measured. This Strategy will also exploit the potential opportunities to repurpose assets to reduce whole life carbon emissions. For example, internally lit bollards at pedestrian crossings in some circumstances may be replaced with unlit retroreflective bollards.

It should also be noted that condition and age of highways assets will have a direct impact on demand for services, as too will availability of investment. This will result in fluctuations in terms of resources and materials employed and corresponding volumes of carbon emissions emitted annually. It must not be assumed, therefore, that increases in the volume of carbon emissions will be the product of ineffective carbon management strategies. The measures in terms of carbon emissions reductions must be viewed against the volume of works undertaken.

Wherever practicable, principles relating to the 'circular economy' (reuse and regeneration of products) will also be employed, not just for assets at the end-of-life stage but also for materials and treatments at the installation and implementation stage. Whole life carbon costs will be significantly reduced if the asset or component can be reused or repurposed instead of disposed of (landfill or combustion).

5.2 Climate Change: the need for Climate Resilient Infrastructure

The effects of climate change, locally and globally, are arguably already evident and are visible through increased occurrence of heatwaves, extreme rainfall events leading to flooding, and prolonged dry spells (droughts). However, the less visible effects, such as damage to ecosystems, sea level rise, loss of biodiversity and decline in local nature, are equally as concerning. Even when net zero has been achieved, global temperatures will continue to rise and climate change will be a significant challenge for the foreseeable future, therefore the need for climate resilient infrastructure will also be sustained.

The Committee on Climate Change (CCC) notes that the most significant climate change risk to UK infrastructure is increased frequency of flooding from all sources. Other climatic aspects which should be considered within our planning for highways and transportation infrastructure include stronger wind, more frequent lightning strikes, high and low temperature extremes, as well as increased fog and high humidity events.

Predictions of increased extreme rainfall events and warmer, wetter, winters means that increased flooding from rivers and surface water will need to be a key consideration for asset management. The ingress of water is renowned for causing asset damage and resulting in early life failure. Storm surges and rising sea levels are likely to have an increasing impact on highways and transportation infrastructure near our coasts, estuaries, and tidal reaches of our rivers. It may be possible to reduce both the regularity and intensity of flooding by identifying problem locations, determining an appropriate inspection and monitoring regime, and ensuring that preventative maintenance such as cyclical cleansing is robust and appropriate.

Asset managers are encouraged to identify areas where ground conditions could be affected by increased rainfall and surface water levels (such as soil saturation or slippage), which could have a profound impact on the performance of assets such as embankments, and to mitigate through appropriate inspection regimes or works to improve stability within existing funding. Similarly, they are encouraged to identify areas where ground conditions could be affected by increased occurrence of droughts. This is particularly relevant in Essex where there are significant areas of clay, making ground conditions prone to movement. For example, there is already a significant amount of dry weather damage on the road and footway networks which will require a substantial investment to address over time.

Asset managers are also encouraged to understand fully the potential for disruption associated with the effects of climate change, as well as the potential for increased costs of

maintaining assets such that they are resilient to anticipated disruption where possible. This course of action may be easier for assets of modern construction than for others, however. For example, in the case of the road and footway networks, for those assets that have evolved over time and are not of modern construction, implementing retro measures to increase resilience is unlikely to be practicable and it is equally unlikely to be affordable.

Climate change adaptation is essential if the Council's net zero ambitions are to be realised. This is recognised by central government which believes that climate change adaptation has not kept pace with climate change risk. In response to this, central government is planning to pilot climate adaptation reporting by local authorities in the fourth round of reporting under the Adaptation Reporting Power (ARP4). This was launched in late 2023, with reports due by the end of 2024. It is anticipated, therefore, that Essex Highways will be required to undertake a climate change impact risk assessment and to include climate adaptation measures in asset management strategies and plans. However, since guidance on this matter is pending from central government, and will require significant Local Authority resource, climate adaptation will be addressed as a separate matter to carbon emissions reduction.

5.3 Asset Management: Lifecycle Planning

The relatively recent impact of climate change on asset resilience, such as extensive dry weather damage on the road and footway networks, is undoubtedly now one of the greatest challenges faced by Asset Management. While in general, the principles of asset management remain relevant for addressing climate change, they must be adapted to new ways of thinking, since ambitions for minimising whole life carbon emissions costs may not always coincide with conventional goals to achieve minimum whole life maintenance costs. This matter will be given careful and thorough consideration, so that decision makers are made fully aware of the risks and benefits associated with the potential trade-off between financial cost and carbon emissions cost, so that a pragmatic plan for achieving net zero can be agreed and ultimately realised.

We employ life cycle planning for all asset groups, from which we produce investment/condition scenarios to support routine, annual capital business cases to recommend levels of investment from ECC financiers. These business cases also include a modelled prediction of revenue investment demand associated with each capital investment scenario. Going forward the lifecycle planning will include the investment impact on whole life carbon emissions costs wherever practicable, to assist with informed decision making.

Local Authority investment levels and central government grants are awarded on an annual basis, which makes long term resource scheduling problematic. The lack of long-term assurance in terms of investment means that works cannot always be procured at the most favourable rates. It can also have impact on the requirement for early contractor involvement to agree carbon emissions reduction plans. This has impact for carbon emissions reduction, especially where options to reduce carbon emissions may have higher financial costs.

This Strategy also acknowledges that, as industry takes time to respond to the climate crisis with new technology and innovative materials and processes, in the short to mid-term the availability of low carbon materials and technology may limit carbon emissions reduction opportunities. However, we will take care in the creation of our proposed palette of low carbon emissions materials and processes, to ensure that decisions are based on whole life carbon emissions, that works can be subsumed within existing budgets, and that implementation does not result in increased risks to highway operatives or road users.

In general, asset management principles require new materials and processes to have been reliably tested over time, to guarantee the service life and benefits claimed by providers. However, it may be necessary to temper this requirement against the realisation that the need for carbon emissions reduction is now urgent and that the opportunities afforded by new innovations may be missed if this principle is upheld rigidly.

In short, in view of the urgency for climate action we recommend a review of our risk appetite for potential early life material failures, while at the same time acknowledging that the risk of early life failures cannot be considered for safety critical situations. For some assets, however, the risk of early life failures may not be safety critical and may be managed through increased monitoring and inspection.

It is a recommendation of this Strategy that as soon as practicable we move to a treatment and materials selection process that is prioritised by the contribution of each selection in terms of its whole life carbon emissions reduction potential, providing costs can be subsumed within currently funding allocations. It is also recommended that lifecycle planning considers circular economy principles, not only for assets at their end of life but for materials and treatments during the installation and implementation stage, for whole life carbon costs will be significantly reduced if the asset or component can be reused or repurposed instead of disposed of (landfill or combustion).

6. Unifying a collaborative commitment to net zero ambitions

To achieve our net zero ambitions, everyone will need to be aware of the challenges, be committed to achieving our objectives, and be prepared to work collaboratively to achieve them. This will include all teams and officers and organisations involved in highway related activities, including officers throughout our supply chain.

6.1 A programme of communications organisation wide and beyond

Effective communications are a key contributor to this Strategy. A programme of communications will be undertaken to sustain a culture of carbon reduction awareness that will include everyone involved in highway related activities – as well as include all

organisations within the supply chain. This will unify everyone to the over-arching objectives and foster a commitment to addressing them through collaboration. It will also keep everyone updated as to progress, as well as include everyone when there is need to address variances between performance and targets. It will also ensure that everyone will be included in the celebrations of successes.

To facilitate effective communication links, Essex Highways will continue to liaise with ECC climate communications team which is an established provider of carbon literacy training.

7. Tackling Decarbonisation at the Design Stage

Arguably, it is the design stage which presents the greatest opportunities for carbon emissions reduction. This Strategy will enable Design Managers to develop a culture that encourages design and technological innovation that drive decarbonisation. This outcome will be achieved through the promotion and utilisation of materials and activities with a lower whole life carbon emissions cost, where practicable and affordable within existing funding allocations, and through promoting activities such as reducing the amount of excavation where practicable.

This culture will be achieved through mentoring by a subject specialist as well as the implementation of a programme of detailed training for designers. For example, the Design Manual for Roads and Bridges (DMRB) a key reference manual for designers, has already implemented net zero thinking.

The objective will be to minimise whole life carbon emissions for every scheme, providing this is cost neutral or within allocated funding levels, not only through designing out carbon but by engaging and collaborating with everyone involved in creating, inspecting, maintaining, and decommissioning of the assets in question. This will be delivered through the systematic identification and implementation of carbon reduction opportunities over the whole life of the assets, by providing clear direction to design and construction partners on the materials needed and their associated carbon content.

To support this process, suppliers will be asked to provide Environmental Product Declarations (EPD) for their products to quantify the carbon cost of their materials. This will enable carbon emission reduction by making it possible for designers to compare the impacts of different materials and products to select the most sustainable option for their scheme. Opportunities will also be identified to set targets on the amount of carbon that can be produced during the execution of the works, based upon estimates made during the design phase, and success in terms of progress to meeting targets will be measured and monitored and reported.

8. Plant and Fleet

The use of plant and fleet in highway activities has a significant impact on carbon emissions, not just the plant and fleet owned or leased by ECC or Ringway Jacobs but those used by the supply chain, too. There is a broad range of plant used on the Essex Highways contract, such as generators and excavators, power tools, and site welfare units and lighting; and there is also a broad range of vehicles used, such as highway safety inspectors' vehicles, Winter Service vehicles for precautionary salting, and Heavy Goods delivery vehicles (HGVs). Many highways' officers also use their own vehicles for purpose of work. All plant and vehicles impact on carbon emissions, depending on their fuel source; those running on fossil fuels have the greatest impact. Fossil fuel free vehicles and construction plant not only emit less CO₂e but lead to improvements in air quality.

This Strategy advocates the quantification of the different types of plant and vehicles used on the Essex Highways contract and it promotes the investigation of opportunities to change fossil fuelled vehicles to electric vehicles (EV) or hydrogen fuelled or HVO fuelled (hydro treated vegetable oil) or converted for use with a Biofuel (a class of renewable energy derived from living materials). The use of Biofuels, for example, is increasing in demand and may have the potential to decarbonise the UK's HGV fleet at the scale and pace required to meet net zero. The realisation of these opportunities will likely require significant investment, but there will NOT be a presumption that investment will be acquired from external sources or indeed provided by ECC. However, it is anticipated that ECC will consider the investment requirements of Essex Highways against their developing ECC electric vehicle strategy and associated targets and recommendations.

To some degree this course of action is already a requirement of central government, as UK regulation will phase out the sale of new petrol and diesel vehicles and hybrid vehicles from 2035.

Investigations will include an assessment of suitable infrastructure that will support these proposed changes, the determination of gaps between existing infrastructure and what is required, and the preparation of business cases to explore in the first instance the acquisition of investment from external sources. It is anticipated that opportunity for external sources of funding will increase going forward as central government ramps up its efforts to achieve net zero.

Availability of investment will be the salient impact on a proposed programme for decarbonisation, but there may well be other issues that will have impact. For example, the move to EV will result in an increase in demand for electricity, and this could lead to a fundamental power supply capacity issue at some Essex Highways depots. The availability of Electric Vehicle charging points across the county will also have relevance, so too may be the availability of hydrogen, HVO fuel or Biofuel supplies.

9. Energy, Offices and Operational Depots

Central government applies a Climate Change Levy (CCL), which is an environmental tax charged on the energy that businesses use. The CCL applies to businesses in the industrial, public services, commercial and agricultural sectors, and is charged on 'taxable commodities' for heating, lighting, and power purposes. It is designed to encourage businesses to be more energy efficient in how they operate, as well as helping to reduce their overall carbon emissions.

ECC energy is 100% renewable, supplied through its contact with Drax. The authenticity of this source is backed by Renewable Energy Guarantees of Origin (REGO) certificates.

The energy sources for Essex Highways offices, operational depots, and highway assets such as Highway Lighting, is more complex. Some of the Highways Operational Depots are included in ECC energy contracts, some have a mix of other energy providers, whereas some network assets energy sources are managed by Mitie the facilities manager for ECC. Ascertaining the degree to which these energy sources are guaranteed 100% renewable with REGO certificates is included in the investigative activities detailed in Appendix A. The objective will be to move all Highways' energy contracts to 100% renewable as soon as existing contractual arrangements permit change.

This Strategy drives energy efficient measures in offices and depots and on our highway infrastructure network to reduce the amount of energy we consume as far as practicable. We are already reducing the requirement for office space by exploiting working from home. This not only reduces the requirement for office space and energy but also reduces transport carbon emissions from employees who would otherwise travel to work. Where there is potential to reduce depot facilities, this will also be investigated fully. To help progress these matters, Essex Highways will liaise with ECC estate planning departments.

ECC has, however, already achieved much in reducing the requirement for energy on Essex Highways activities. For example, the street lighting stock is being converted to L.E.D. lighting, which requires less energy than conventional lamps. The street lighting is already around 90% L.E.D., and it is anticipated that the remainder of the stock will be converted to L.E.D. by the end of financial year 2023/24.

There is also a central management system (CMS) for street lighting, which not only controls the times that lights are switched on and off but also controls the levels of lighting. For example, L.E.D. lighting provides a higher level of lighting than conventional lamps, therefore energy levels to L.E.D.s can be controlled to provide the level of lighting required at the most energy efficient settings. The CMS also enables part-night lighting, which restricts the hours that street lighting is provided to the times when it is most needed, thereby achieving significant energy and CO₂e savings.

All outstanding Traffic Signal high intensity lamps are also being converted to L.E.D. via an approved three-year investment programme which commenced in 2023/24. Over 63% of

Traffic Signals also now operate on low voltage, and remaining assets will systematically be converted to low voltage where this is appropriate.

Our energy management will also include investigating opportunities to phase out gas heating and switch to heating using renewable sources. For example, we have already installed solar panels to heat water at some of our operational depots as well as to power roadside infrastructure, and we will determine if there is capacity to deploy solar panels on a wider scale. For instance, there is potential for solar canopies over car parks and for small, ground mounted solar systems at depot premises or larger roadside areas. Where space permits, we will also explore the potential for installation of wind turbines, which are a strong complement to solar energy. These potential arrangements may include use of off grid battery storage on site, but they could develop key sites / depots into becoming energy centres with power to grid arrangements that provide local energy to the wider community.

We will also investigate the possibility of harvesting energy by converting vehicle vibrations from traffic driving over our road network. This requires piezoelectric crystals to be laid under the asphalt when road surfaces are constructed or renewed. The crystals have a special property that converts mechanical energy into an electric voltage as they're distorted by passing traffic. While this possibility may seem quite niche at this stage, both the network and vehicular traffic are vast and therefore represent significant potential for the future.

The Essex Highways Contract will also continue to benefit from energy savings identified by Ringway Jacobs through their involvement with The Energy Savings Opportunity Scheme (ESOS). ESOS is a central government managed, mandatory energy assessment scheme for organisations in the UK that meet the qualification criteria. Ringway Jacobs qualifies for ESOS and therefore carries out ESOS assessments every four years. These assessments are audits of the energy used by their buildings, industrial processes, and transport to identify cost-effective energy saving measures.

This Strategy strives to replace energy intensive products and services with low energy products and services, and to convert all energy sources to 100% renewable as soon as practicable. It also encourages exploring the potential for Highway's depots and roadside areas not only to be used for generating their own renewable energy but to becoming energy centres for the wider, local communities.

10. Low Carbon Emissions Materials for Highway Works

Asphalt, cement, and steel are arguably the most common materials specified for highway related works. To some degree, Local Authorities will be relying upon innovators within industry to provide opportunities for carbon emissions reduction through new materials and processes.

Highways will manage the trial use of new, innovative materials and processes through its technical working group which was established to monitor the specification of materials

employed on the Essex Highways contract. It will assess the benefits, risks and constraints associated with these innovations, then implement where appropriate, where improvements in carbon emissions reduction can be realised without financial burden or increased risk to operatives or highway users.

The use of low carbon cement, for example, can result in 80% lower carbon compared to more conventional cement. However, care must be taken to employ materials that reduce carbon emissions over the whole life of the asset, rather than quick fixes that can result in higher whole life carbon emissions. For example, if new treatments have reduced service lives, they will require more frequent replacement which could result in higher carbon emissions over time (whole life carbon emissions). New materials must also conform to stringent technical requirements to meet design standards and have a proven life in terms of reliability and or repeatability to reduce the risk of costly failures.

The use of warm mix asphalt (lower temperature asphalt) for road resurfacing is already recognised as a lower carbon emissions alternative to general asphalt, and in 2022/23 15.4% of asphalt specified was warm mix. This was mostly used for binder applications, but trials have been undertaken using warm mix for surface applications. We will review results of warm mix for surface applications and where practicable extend use of lower temperature asphalt across our network.

Other road surfacing treatments, such as Surface Dressing and Micro Surfacing, have a low carbon emissions cost, and these treatments are exploited as far as practicable in our Preventative Approach to capital road maintenance, which seeks to promote low financial cost treatments to arrest early stages of road condition decline, before increased deterioration requires higher cost strengthening treatments. However, the focus of this Strategy is on 'whole life' carbon emissions management that seeks to minimise carbon emissions over the life of the asset, as opposed to quick fixes that may reduce carbon emissions in the short term but ultimately result in higher carbon emissions in the future.

Wherever practicable, principles relating to the 'circular economy' (reuse and regeneration of products) will also be employed for materials and treatments at the installation and implementation stage.

11. Reducing Wastage, and Recycling

We have a Key Performance Indicator that measures the % of material recycled on the Essex Highways contract, and generally our performance in recent years has been improving upon our targets. The benefits of this are reduced wastage, reduced need for new materials, as well as reduced quantity of vehicular movements and related transport carbon emissions. This Strategy will explore the potential for increasing the recycled aggregate content within asphalt mixes and the use of recycled or synthetic binders and additives.

We will strive to achieve more, however, through exploring the potential for storing materials removed from site, so their use can be recycled at opportune times. There are already surfacing materials available which are created from recycled road surfacing materials removed from site, and the opportunity to investigate their wider application will be investigated by the Technical Working Group.

In the case of the removal of road surface materials, we could employ mobile crushers and subsequently store the material on a suitable land site. We currently apply material such as this on Public Rights of Way maintenance and improvement schemes. This storage facility could be shared with utility companies undertaking works in the highway, to make the process more financially viable, and where storage volume outstrips use by highways, we could sell good quality recycled materials to third parties.

We will also explore the use of technology to estimate more accurately how much material we require for fixing localised defects, to avoid recycling or wastage. We will support this through reviewing and improving the specifications detailed by our engineers and designers. We will also extend our measurement of waste to a wider range of activities, so that we can better understand how much material is subject to disposal and what proportion of the waste is excavated material or material taken to site which proved surplus.

We will review our use of 'hot boxes' used to keep asphalt materials warm on site, so that we can extend the period of viable use and therefore reduce wastage. We will then explore the potential for increased use of this facility where this is practicable and beneficial. We will measure the split between new asphalt and recycled aggregate used in our activities, and endeavour to reduce the use of new material.

On the matter of basic maintenance, when we remove materials such as kerb stones, rather than transport them back to the depot for disposal, we will explore the potential for their reuse.

We have already implemented an organisation wide ban on single use plastics. We will also explore opportunities to implement circular economy principles, such as mandating suppliers to take back 'shrink wrap' and other packaging for them to reuse.

We will endeavour to reduce use of paper at our offices and operational depots. We will also make a qualitative assessment of use of water to encourage its efficient use, and support this through the measurement of all water consumption and the setting of water reduction performance targets.

The need to reduce wastage will also tie in with our overall consideration for reuse and regeneration of products, not just for assets at the end-of-life stage but also for materials and treatments at the installation and implementation stage. In this way, whole life carbon costs will be significantly reduced through asset or component reuse or repurpose instead of disposing in landfill or through combustion.

12. Procurement and Supply Chain

We acknowledge that we can only deliver our net zero ambitions with the support and involvement of our suppliers (supply chain/value chain). The procurement process is critical to influencing accelerated whole life carbon emissions reductions in the supply chain, as it is a mechanism that potentially can be used to incentivise carbon emissions reduction behaviours. Where possible, therefore, this Strategy will encourage the development of procurement guidance to promote the purchase of low carbon options for materials and services, and we will incentivise this approach where this provides value for money and significant carbon emissions reductions within existing contractual agreements. Market testing during the procurement process will be undertaken to ascertain how carbon emissions may be reduced, which will help us learn about any advances in low carbon alternative materials and processes.

We will encourage our suppliers to implement carbon management systems and to embed approaches that minimise emissions, including lean construction practices and the principles of the circular economy. We will develop and agree roadmaps to net zero for all our key construction products where this is practicable and achievable. This will focus on implementing carbon emissions reduction rather than focusing on inseting or offsetting, to drive carbon emissions reduction behaviours throughout the supply chain. For example, promoting the choice of materials and compounds created with renewable energy, as well as purchasing more sustainable and efficient products and services with the aim of achieving the best long-term, overall lowest carbon emissions cost.

We will liaise with ECC procurement teams for advice and support to help suppliers progress carbon emissions reduction plans.

13. Maintenance and Construction

We will encourage early collaboration between the commissioning team and construction team to share ideas that model potential carbon emissions savings. Contractors will be encouraged to monitor and disclose data on the actual materials, construction plant, fuel type and consumption rates which are used during the execution of highway related works, to allow measurement and monitoring. This will include carbon emissions for environmental maintenance materials, such as precautionary salt applied during winter months. This approach may be applied to reactive, revenue funded maintenance activities as well as broader scoped capital funded maintenance and improvement works. For those occasions where carbon emissions targets are implemented, contractors will be expected to report progress of their performance against any targets set for carbon or permitted waste, as well as to work collaboratively to address any negative variances.

Availability of zero emission construction machinery is increasing as manufacturers innovate, and we will also work with our supply chain to trial zero emission plant on our schemes. To support this approach, we will explore the potential to reduce the distances travelled to transport materials to and from site and encourage our supply chain partners to use the lowest form of feasible and available transport. We will also identify opportunities to work more efficiently, reduce material use and reduce wastage. This approach will include asphalt recycling, moving to battery powered hand tools, and will include considering more local suppliers within existing contractual agreements, to reduce transport carbon emissions. We will also explore use of renewable energy or hybrid arrangements for site lighting, signage, Close Circuit Television (CCTV) and welfare facilities.

14. Developer Guidance

The 'Essex Design Guide', which is accessible from the ECC website, provides guidance to developers, which includes guidance on environmental sustainability. The Essex Design Guide has over forty-five years of leading the success of development in Essex, and it reflects the project outcomes of the Climate Change Commission. Currently within the Essex Design Guide, there are a series of sections which refer to climate change, either as part of a specific intervention or as recommended best practice. A Net-Zero Toolkit is also available to developers, designed to assist in the planning, design and construction of a new build or retrofit housing projects.

Our actions to address climate change will continue to have a significant impact for developers. Future design guidance will need to take this Strategy into account, with a view not only to carbon emissions reduction in the construction of developments but reduction in whole life carbon emission to be derived through ongoing maintenance from asset adoption. This will likely have impact for commuted sums from developers, especially where maintenance operations to achieve carbon emissions reduction will result in higher costs.

It should also be noted that the requirement for 10% biodiversity net gain from construction projects requiring planning consent is expected to become law in January 2024. However, Local Authorities are not restricted to 10% and can request more demanding requirements. Also, there are plans by central government to make sustainable drainage systems (SuDS) mandatory for new developments, by implementing Schedule 3 to the Flood and Water Management Act 2010, possibly during 2024. Note that if fewer new connections are made to combined sewers through introducing more sustainable urban drainage systems (SuDS), it will reduce the pressures on the sewers, reducing surface water and sewer flood risk, reducing discharges from storm overflows with its associated pollution whilst unlocking land and improving biodiversity and amenity.

This Strategy supports ongoing work with Development Managers, to understand the impact of the biodiversity net gain law so that we may respond positively to it. This Strategy also

encourages better understanding of the potential implementation of Schedule 3 to the Flood and Water Management Act 2010, so that implications may be determined.

15. Reducing Road User Demand

The future of road travel may become a zero carbon one, powered by renewable electricity, hydrogen and biofuels – indeed the emerging LTP(4) sets out plans for decarbonising transport. This Strategy for decarbonising highway maintenance, renewals and inspection activities will dovetail in with these plans. For now, however, the County's transport emissions are higher than the national average and therefore we have much to do to achieve our net zero ambitions. It should also be noted that with the population of the County is expected to grow from 1.9 million (in 2016) to 2.1 million by 2036. In relation to this, the Committee on Climate Change forecasts that in 2050 traffic levels will be higher than today.

Much of the highway infrastructure network that will be in operation in 2050 and beyond is already here, and given the potential increase in traffic levels, any initiatives for reducing network use demand will have multiple benefits. It will reduce congestion, improve air quality by reducing carbon emissions, and potentially enable extended service life to infrastructure assets which will also reduce whole life carbon emissions.

We will encourage reduction in network demand by encouraging use of active and sustainable modes of transport such as walking, cycling, and taking the bus or train. Our Developers and highway scheme designers will promote well-planned cycling and walking routes across urban and rural locations that lead to bus terminals and railway stations. We will also work with businesses to improve onsite cycling facilities and develop cycle routes that link with the national cycle network where appropriate, and we will continue to promote Park and Ride facilities to encourage more widespread use of public transport.

We will also address the challenges around encouraging residents to avoid or reduce unnecessary private car journeys. For example, one way is through 'destination shifting' - for residents to use local shops rather than drive to out-of-town retail parks. This challenge will require us to encourage behaviour changes so that residents not only question the way they travel but also question why they are travelling. We will also continue to exploit the working from home to avoid travel, and we will incentivise low carbon travel options such as the recent implementation of the government scheme to provide low bus fares. In addition to making alternative options more attractive, we will investigate policies that make car travel less attractive, and we will encourage people to car share.

Where road journeys are essential, we want to improve vehicle efficiency by making alternatively fuelled options, such as electric vehicles (EVs), easier to run for both personal and professional use. To support this, we will encourage the Council to increase the number of EV Rapid charging points on the network. However, simply to replace carbon-emitting cars with electric cars will not solve problems with congestion, so we will still need to make it easier for people to take alternative methods of transport. This can be encouraged by

improving the reliability and quality of sustainable transport – such as through the Council's bus service improvement plan which is under development.

We will also investigate means of decreasing congestion through undertaking a network review of existing traffic management infrastructure to ensure traffic efficiency is maximised. To support this, our traffic management infrastructure renewals and improvements schemes will also consider priority measures that produce efficient corridors of traffic movements to reduce congestion and improve air quality, while at the same time improving the user experience for cyclists and pedestrians, especially for vulnerable users.

With a view to future proofing, a longer-term objective will be to develop network connectivity to support connected and autonomous vehicles. This will improve capacity through improved traffic management and better use of road space. For example, Vehicle Platooning is part of a suite of features that self-driving cars might employ in the future; a platoon is a group of vehicles that can travel very closely together, safely at high speed. Each vehicle communicates electronically and autonomously with the other vehicles in the platoon.

16 Air Quality – The Essex Air Quality Consortium

Air pollution is recognised as the largest environmental risk to public health in the UK and is linked to up to 36,000 deaths each year. It reduces life expectancy by causing cardiovascular and respiratory diseases and lung cancer and can exacerbate existing health conditions, such as asthma. In Essex, 5.5% of deaths in the county (almost 900 deaths) in 2021 were attributable to air pollution.

The Essex Air Quality Consortium is formed of the twelve district, borough, and city councils in Essex, as well as Essex County Council as the highway authority and the two unitary authorities in Greater Essex, Southend-on-Sea City Council and Thurrock Council. The consortium was established in 1995, following the Government publication 'Meeting the Challenge', reflecting the aspirations of local government to undertake more local air quality work in Essex.

The Consortium is on a mission to improve air quality in Essex, working collaboratively to make changes across the county that will help to make the air we breathe cleaner and healthier. Due to the declaration of an increasing number of Air Quality Management Areas (AQMAs), and as a result of increased traffic growth and congestion, the Consortium is working much more closely with the Local Transport Authority in Essex County Council to seek improvements to air quality where possible.

The Essex Air website, created by Essex County Council on behalf of the Essex Air Quality Consortium, is the latest example of this collaborative working and was developed following a successful Defra Air Quality Grant bid. The website includes an air pollution map that summarises the results of air quality monitoring undertaken by each of the local authorities within Essex. Both 'historical' and 'live' data are presented. It also includes advice on

changing how and when people travel as well as advice on how to lessen exposure to indoor air pollutants.

The Defra Air Quality Grant funding was also used to undertake air quality monitoring around primary schools in Essex within 1km of an Air Quality Management Area (AQMA). The council is also currently developing a new Essex Air Quality Strategy, which it plans to consult on shortly.

Councillor Peter Schwier, Essex County Council Climate Czar and Cabinet Member for Environment, Waste Reduction and Recycling, stated: “As part of the Essex Air Quality Consortium, we are working closely with all of the councils in Essex to help tackle air pollution and raise awareness of the small steps we can all take to reduce our own emissions and help make the air we breathe cleaner and healthier...”

As part of their mission, the Consortium is helping the people of Essex understand what air quality is and how people can play a part in making it better. Air pollutants are emitted from a range of both man-made and natural sources. Many everyday activities, such as transport, industrial processes, farming, energy generation and domestic heating, can have a detrimental effect on air quality.

As well as being emitted directly, primary particulate matter (PM), emissions from different sources react in the air to become secondary PM. This gets transported a long way from its source, increasing exposure. The major sources of air pollutants in the UK are:

- Industrial processes are a major source of nitrogen oxides (NO_x), PM and volatile organic compounds (VOCs).
- Agriculture is the main source of ammonia (NH₃) pollution.
- Non-road mobile machinery like construction equipment is an important source of NO_x, PM and VOCs.
- Shipping and other transport is a major source of NO_x, sulphur dioxide (SO₂), PM and VOCs.
- Road transport is the largest source of NO_x in the UK, and it is the main source of NO_x at the roadside. It also produces PM, VOCs and small amounts of SO₂.
- Domestic solid fuel burned in homes is the largest source of PM_{2.5} in the UK.

This ECC Essex Highways Decarbonisation Strategy supports the work of the Essex Air Quality Consortium as well as the emerging ECC air quality strategy.

It is also worth noting that the current bid to the DfT for additional traffic signals funding for 2024/25 and 2025/26, prepared by ECC and Essex Highways, will focus on improving the efficiency and timing of traffic signals. This will improve traffic flow, promote the priorities of vulnerable users, promote active travel and sustainable transport, reduce traffic congestion, reduce carbon emissions, and improve air quality.

17. 'Insetting' and 'Offsetting' CO₂e through Tree Management

'Insetting' and 'Offsetting' carbon emissions through increasing carbon absorption is generally viewed as a last resort, as focusing on absorption rather than reduction can drive the wrong behaviours for environmental sustainability. This Strategy focuses on collaborative and systematic carbon emissions reduction for all highway related activities as a priority. However, these activities have historically been responsible for high carbon emissions, and to some degree until industry can innovate low carbon options, have the potential to continue to be responsible for high carbon emissions for some years to come. Reducing carbon emissions will likely be a developing process over time, and even when low carbon processes are well defined and embedded there is likely to be residual carbon emissions that will require absorption. Giving attention to insetting and offsetting, therefore, is a key requirement for achieving net zero.

It is widely acknowledged that planting trees is the most sustainable way to absorb carbon emissions, as forest projects not only absorb CO₂e but improve air quality, encourage biodiversity, reduce flooding, and reduce the urban heat island effect. Indeed, planting more trees to absorb carbon is an objective already being progressed by the Council. ECC has a tree management plan [Plans and strategies: Tree management | Essex County Council](#) for the hundreds of thousands of trees it owns across the County. Most of these trees are on the streets and roads of Essex and the extensive woodlands and hedgerows ECC owns in the countryside.

ECC is committed to managing, improving, and extending its tree stock, and to this aim it has a defined tree planting programme across the county, which endorses the recommendations made in the report 'Net Zero: Making Essex Carbon Neutral'. In 2019, for example, the Essex Forest Initiative secured funding to plant 375,000 trees over five years. Records show that tree planting performance has already exceeded expectations, with 241,560 trees and 23,664 metres of hedgerows having been planted in the first three years.

A priority of the Tree Plan is to establish the size of the tree stock associated with Highways and assess its health, and ECC will aim to carry out regular inspections of its tree stock. It should be noted, however, that not all Districts are currently included within the Tree Plan. The relevant results of the inspections, however, will be recorded in a tree management system which will be a key reference source for improving the overall health of the tree population for those Districts currently within the scope of the Tree Plan. This will not only retain the carbon already locked up in the trees for much longer periods but by supporting healthier growth of the tree population, will enable the existing tree population to grow further thus enabling the locking up of increased amounts of carbon. All new planting will also be recorded on the tree management system, and this will allow for maintenance and aftercare to be suitably managed and monitored. ECC is already exploring opportunities for increasing its highway related tree stock:

- Identifying new tree planting opportunities in the Highways and wider ECC estate as part of the tree inspection process.
- Replacing the recently felled trees on the highway network in accordance with the tree planting principles in the tree plan.
- Creating tree lined streets and roads by retrofitting trees, utilising existing or new funding programmes.

The Tree Plan outlines the Green Streets initiative on Essex Highways land which will proactively assess sites for new street trees which will have enough space and favourable environmental conditions to ensure vigorous tree growth, thus locking up additional carbon. Choosing sites for planting on Essex Highways land, however, is a matter that requires very careful consideration to avoid creating road safety concerns or additional maintenance issues with the adjacent highway's infrastructure such as roads, footways, and drainage. Where appropriate, tree root retention infrastructure may also be needed to avoid root damage to adjacent public or private assets.

For more detailed information refer to the ECC Tree Plan.

ECC is also working with farmers and landowners across the county, with a view to exploring the market potential of CO2e credits, which will enable businesses and other external organisations to purchase means of CO2e offsetting. The British Standards Institute is working with all parties to develop a process that will provide assurance for standards as well as provide confidence in contractual agreements.

18. Improving Green Infrastructure, Local Nature Recovery, Flood Alleviation, and Biodiversity, and Better Management of Water Resources.

In striving for net zero, this Strategy recognise the complex interdependencies between decarbonisation and other important climate adaptation issues, such as the need for improvements required to green infrastructure, local nature recovery, flood alleviation and the need for better water management – all of which will have benefits for biodiversity, promote health and wellbeing and will add positive social value.

The publication 'Net Zero: making Essex Carbon Neutral by 2050', by the Essex Climate Action Commission, recommends actions to address the climate and biodiversity challenges, and it states: "The natural world is our best ally in reversing climate change – it is key to absorbing and storing carbon."

For more detailed information relating to these improvement objectives, please refer to the ECC Essex Highways Strategy for managing its Green Estate.

18.1 Improving Green Infrastructure, restoring Local Nature

Roads impact on biodiversity through ecosystem destruction and fragmentation by severing links between places of habitat. The transport network has a huge impact on our environment and our quality of life. This Strategy supports the investigation and identification of opportunities for how Highways can actively support the natural environment. For further information please refer to the Essex County Council Essex Highways Strategy for Managing its Green Estate.

18.2 Biodiversity Duty

Biodiversity provides a variety of species, habitats, and ecosystems. It is essential for human existence and our environment by delivering key services including clean air and water. The negative impact of humans on the environment is well documented, as are the concerns regarding sustainability. Without significant changes, multitudes of species will be eradicated from the planet. The loss of species and habitats poses as much a danger to life on Earth as climate change.

Consideration of Essex Highways activities to improve green infrastructure, local nature recovery, flood alleviation and better management of water resources, will have the potential to support our Biodiversity Duty. Public authorities who operate in England must consider what they can do to conserve and enhance biodiversity in England. This is the strengthened 'biodiversity duty' that the Environment Act 2021 introduces. For further information please refer to the Essex County Council Essex Highways Strategy for Managing its Green Estate.

18.3 Biodiversity Net Gain

The requirement for 10% Biodiversity Net Gain (BNG) for schemes requiring planning consent is expected to become law in January 2024. When applied and where applicable, this will include Essex Highways schemes. For further information on how highways will meet this legal requirement, please refer to the ECC Essex Highways Strategy for Managing its Green Estate.

18.4 Water Management

Essex is one of the top ten areas at risk of surface water flooding in the UK. This seems incongruous, given that East England is the driest part of the UK and is seriously water

stressed (having difficulty meeting current water demands). It is the increased frequency of extreme rainfall events through climate change that contributes to flood risk.

However, East Anglia is a major producer of food which requires a high level of water, it is also the location for a significant amount of industry which also requires water, and it is also an area of significant housing growth which will increase water consumption. Essex is already severely water stressed: so much water is being taken out of the environment that the health of the environment is suffering.

While water management is already included in design guidance for significant, new schemes and housing developments, there is more we can do through asset maintenance, improvements, and renewals operations to not only support flood alleviation measures but also to improve our management of our water resources. For further information please refer to the ECC Essex Highways Strategy for Managing its Green Estate.

19. Social Value

Measures to improve environmental sustainability provide multi-functional benefits integral to the health and wellbeing of our communities. The promotion of sustainable transport, cycling and walking, improves air quality through reduced traffic congestion. Together with the management of our green estate, it also supports access to open, green spaces for recreation, leisure, relaxation, exercise, and play. This connects people with nature and heritage, and it enhances a sense of place which encourages social interaction and inclusion that foster strong communities. These outcomes benefit public health through improved psychological health and mental well-being which encourages independence. Enhancing a 'sense of place' is a strong theme in the emerging LTP(4), and Highways activities will continue to contribute to this outcome.

We will also continue to take account of how people access green spaces to encourage modal shift from cars to more sustainable and active travel options. This will include the objective of improving the travel experience for the most vulnerable road users, such as pedestrians and people with disabilities, as well as cyclists, and public transport users. These outcomes contribute to positive social value and can be measured by ECC Toms Social Value Calculator, where themes are based on 'Everyone's Essex'. This Strategy will explore the potential for social value measurement, with a view to setting a base line and developing improvement targets. The social values in question, however, will include all highway activities, not limited to the activities relating to this Strategy.

20. Risk

The Asset Management Strategic and Tactical Risk Review Process, which is planned to be undertaken quarterly, will include Carbon Management Risks, to support this Strategy. Key

risks will be around asset management planning and investment, but there will also be change management risks associated with potential changes to roles arising from the carbon emissions management process which may impact on employment security.

21. Performance Review and a Culture of Continuous Improvement

Senior managers within the organisation, as well as leaders in other organisations within the 'supply chain', will be responsible for promoting a culture of continuous improvement. Continuous improvement is a core part of the carbon management process that allows lessons learned to improve the delivery of current and future activities. Continuous improvement also allows organisations to mature their carbon management experience and learn from each other about effective decarbonisation approaches, including innovations. This will also include benchmarking performance with others where methodologies have been consistently applied, which can foster a competitive edge between organisations that can help drive progress.

This approach will help us to prioritise improvement initiatives.

Appendix A: Climate Action Activity and Timeline

ECC Essex Highways Decarbonisation Strategy: Climate Action Activity and Time Line

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Carbon Emissions Baseline and Setting Reduction Targets	1	Baseline Scope 1, Scope 2, and Scope 3 carbon emissions. In the case of Scope 3 emissions, if full information not available, baseline salient goods, services and activities, focusing on high emissions where practicable.	Ongoing annually for Scope 1 and Scope 2. For Scope 3 by 2025/26 then ongoing annually.
Carbon Emissions Baseline and Setting Reduction Targets	2	Measurement of Scope 1 and Scope 2 carbon emissions is already well developed. Explore a variety of available options for measuring Scope 3 carbon emissions. For example, the Essex Highways procurement system is to include carbon emissions factors for each service and material type, so that a running total of embedded carbon can be calculated as items are procured. It may also be possible to estimate Scope 3 emissions outturns by applying the Government GHG Conversion Factors to the value by category of works implemented annually.	End of 2024/25 for go live of estimating Scope 3 through the Essex Highways procurement system. Ongoing for exploring other options for identifying Scope 3.
Carbon Emissions Baseline and Setting Reduction Targets	3	Identify and apply the level of resources required to review work stream activities, processes, and materials to measure carbon emissions and to identify and implement carbon emissions reduction opportunities. Manage this approach through a steering group with satellite work groups for salient work streams.	2024/25
Carbon Emissions Baseline and Setting Reduction Targets	4	Determine means of measuring carbon emissions data in a consistent and reliable manner, following the Greenhouse Gas Protocol (GHG) Guidance or similar industry standard, and undertake appropriate record keeping. This will be supported through the exploration of Carbon Emissions Calculation Tools as these are developed by industry and external organisations. (It should be noted that as industry and organisations respond to the requirement for carbon emissions measurement, the Tools being developed and employed may not guarantee consistency of results). Include governance and data security in the process and record the level of accuracy relating to any data collected. However, avoid setting onerous record keeping and measurement processes that require unsustainable levels of resource.	Ongoing

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Carbon Emissions Baseline and Setting Reduction Targets	5	Where the implementation of carbon emissions reduction opportunities requires additional investment, prepare business cases to explore the availability of external funding in the first instance. Include robust financial cost/carbon emissions reduction benefits so that investors can make informed decisions.	Annually by October each year.
Carbon Emissions Baseline and Setting Reduction Targets	6	When agreeing and setting Key Performance Indicators (KPIs) for carbon emissions reduction, ensure that indicators can be measured readily and reliably and ensure that targets are pragmatic and achievable. Avoid setting KPIs for isolated assets/services that could result in increased whole life carbon cost in future years.	2025/26
Carbon Emissions Baseline and Setting Reduction Targets	7	In agreeing and setting KPIs, consider the Authority's appetite for asset management strategic and tactical planning risk. This point is significant but does not refer to road safety risk or risk to highway users or operational risk to staff implementing works and services on the ground. Ordinarily, the Authority would only wish to implement new materials and processes when these have been trialled and tested thoroughly and found to be completely reliable and repeatable so that the service life and benefits can be realised fully. The degree to which the Authority can wait for assured results may need to be tempered with the urgency for action. The possibility of early introduction of new ideas could result in early life failures for treatments or practices that fail to produce all the anticipated benefits. The Authority may need to adopt a greater sense of courage to risk failure if it is to make progress to net zero in a suitable time frame. Risk of early life failure can be managed via appropriate inspection/monitoring regime. Safety Critical assets/components will not be included.	Ongoing
Carbon Emissions Baseline and Setting Reduction Targets	8	Report carbon emissions outcomes in an open and transparent manner. Track progress to meeting targets and respond to any gaps identified in progress to meeting targets, which may require reviewing the effectiveness of activities and methodologies and implementing changes.	Ongoing

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Carbon Emissions Baseline and Setting Reduction Targets	9	Evaluate the skills and capability within the organisation as well as within related organisations. Where necessary, provide further training in relation to GHG assessment, calculating baselines and targets, identifying and implementing low-carbon solutions, monitoring and reporting.	Ongoing
Asset Management Planning	1	Include Whole Life carbon emissions modelling in the lifecycle modelling across all major assets where applicable, to determine the type and proportion of treatments that will deliver the optimal long-term balance of financial and carbon emissions costs.	2024/25
Asset Management Planning	2	When drafting the annual capital business cases to petition ECC for investment for all assets, include the impact on carbon emissions in the investment/condition scenarios and risks referenced, as far as practicable, so that financiers can make informed decisions on the balance between financial cost and carbon emissions costs.	2024/25
Asset Management Planning	3	Include carbon emissions reduction risk, including risk to 'insetting' and 'offsetting', in the Asset Management Strategic and Tactical Risk Review and reporting process.	2024/25
Asset Management Planning	4	For active travel routes to be useable all year round, they may need to be included in winter maintenance to make routes less hazardous in sub-zero temperatures. These potential requirements could have a significant impact on highway maintenance activities and financial costs. Assess investment need and prepare business to explore the availability of external funding in the first instance	2025/26
Asset Management Planning	5	Continue to explore the deployment of survey drones for structures inspections, to reduce activities associated with accessibility to the asset. Also explore opportunities to undertake routine, safety inspections for roads, footways and cycleways using artificial intelligence (AI) to reduce the number of personnel required. All these developments provide value for money and a lower carbon emissions costs over conventional activity.	Ongoing

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Asset Management Planning	6	Continue to represent Asset Management interests via attendance of the Essex Highways Carbon Reduction Steering Group and other related Work Groups, in order to coordinate links between this Strategy and the overall carbon reduction management process. Work with other ECC service areas, departments as well as external organisations where appropriate, to help identify and integrate lower carbon emissions initiatives. Maximise opportunities for carbon management by sharing and learning.	Ongoing
Asset Management Planning	7	Set out and agree with ECC Highways Commissioning a Strategy for how we will manage our highway green estate, including PRow, to facilitate carbon emissions removal, noise reduction, improved air quality, improvements to green infrastructure and local nature recovery, improvements to water management, and improvements to biodiversity and social value. Integrate plans for managing ECC Highways Green Estate with environmental sustainability priorities emerging through the anticipated revised Local Transport Plan(4).	2024/25
Asset Management Planning	8	Assess the effectiveness annually of this Strategy through identifying progress to carbon emissions reduction, and report progress openly to ECC Senior Leaders as well as Essex Highways Leaders. Revise Strategy to ensure that it continues to reflect the latest agreed measures, investment levels, vision, and Council priorities.	First review end of 2024/25
Communications Planning	1	Implement a programme of communications to sustain a culture of carbon reduction awareness across Essex Highways. Include our supply chain partners and cross contract organisations. The Carbon Management process could result in feelings of employment insecurity, so include links for 'change management' support.	Ongoing from October 2023
Communications Planning	2	Publish ECC Essex Highways Decarbonisation Strategy on the Essex Highways website as a supplementary, strategic document to the Highways Infrastructure Asset Management Plan (HIAMP).	End of 2024/25
Communications Planning	3	Develop Environmental Sustainability web pages to sustain a culture of carbon reduction awareness across Essex Highways and to communicate progress on: decarbonisation, as a well as improvements to green infrastructure, local nature recovery, and water management. Include benefits to biodiversity and social value. Celebrate successes.	End of 2024/25

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Design Planning	1	Senior managers to develop a culture that supports and encourages design and technological innovation that drives all aspects of decarbonisation within existing budgets. (This will include promoting improvements to green infrastructure, local nature recovery, water management and biodiversity).	Ongoing
Design Planning	2	Identify and implement a programme of detailed training for designers so that minimising whole life carbon emissions can be undertaken for every scheme. The following will be key considerations: designing out carbon emissions; utilising materials and activities that will result in reduced carbon emissions; exploring reduced amount of excavation; carbon cost of operating, maintaining and decommissioning assets. Training can be cascaded through internal subject specialists.	Ongoing
Design Planning	3	Investigate Carbon Calculation Tools. Identify and implement the most appropriate Tool(s) for achieving a practicable and consistent means of measuring carbon emissions that will permit baselining as well as benchmarking with other organisations and Local Authorities. Encourage organisations within the supply chain to use the same Tool(s). Include the Carbon Calculation Tool being developed by Geo Place that is intended for use by teams that schedule permits for utility works and other works within the highway. It is anticipated that Carbon Calculation Tools will continue to be developed and produced over the next five to ten years as industry responds to the net zero challenges. Links with Carbon Emissions Baselining and Setting Reduction Targets item 4.	End of 2024/25 for identification of first Tool(s), but assessment of new Tools will be ongoing
Design Planning	4	Designers to refer to Environmental Product Declarations (EPDs) for materials, to quantify the carbon cost of materials specified, to support carbon emission reduction by making it possible to compare the impacts of different materials and products to select the most sustainable option. Requires collaborative liaison with Procurement. Use baselining data to develop a bespoke database that can be used to estimate and compare the carbon emissions of different scheme design options at the feasibility and detailed design stages.	End of 2024/25

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Design Planning	5	Enable designers to provide clear direction to construction partners on the materials we will need and the carbon content of these. Designers to identify opportunities to set limits upon the amount of carbon emissions that can be produced during the execution of the works based upon estimates made during the design phase. Designers/Construction partners to monitor progress towards achieving targets throughout the construction process and to address variances collaboratively.	End of 2024/25 for first carbon emissions estimate/target setting scheme, then Ongoing
Design Planning	6	Designers to include the ongoing need for climate resilience in their planning.	Ongoing
Plant and Fleet Planning	1	Investigate opportunities to change fossil fuelled vehicles to electric or hydrogen or biofuel (excluding HGV and other larger vehicles). Also assess suitable infrastructure that will support this change and determine gaps between existing infrastructure and required infrastructure, including availability of alternative fuels. Prepare a business case to explore availability of external funding in the first instance. Note that a potential move to Electric Vehicles (EV) will result in increase in demand for electricity. There may be a fundamental power supply issue that is blocking installation of EV chargers at operational depots. May need to increase incoming supply. Links with 2 below.	End of 2025/26 for provisional assessment and business case. Links with 2. below.
Plant and Fleet Planning	2	Regarding Larger Vehicles, such as Winter Service vehicles and other Heavy Goods Vehicles (HGVs), assess if these could be changed to Hydrogen or biofuel (to support government's zero emissions HGV trials and developing policy on zero carbon HGVs). If viable, take part in trials and determine viability of changing all similar fleet vehicles. Also undertake assessment of the availability of hydrogen or biofuel in Essex and whether these fuels would need to be stored on site if permissible. Prepare business case to explore availability of external funding in the first instance. Links with 1. above.	End of 2025/26

Climate Action Category	Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Organisation Emissions	Energy, Offices and Operational Depots Planning	1	Identify the current energy sources for offices and operational depots and highway assets, and for those not on 100% renewable energy contracts, move to 100% renewable energy sources when current contract timelines permit change. Acquire Renewable Energy Guarantees of Origin (REGO) certificates validating energy source as 100% renewable. May require liaison with ECC Energy and Low Carbon Team and Mitie. Note there is no defined Depot Strategy, but this discipline sits with Head of Maintenance and Operations	Ongoing
Organisation Emissions	Energy, Offices and Operational Depots Planning	2	Upgrade all Street Lights to L.E.D. Continue to utilise Central Management System (CMS) to control lighting levels and part-night lighting, to save energy.	100% conversion will be completed 2023/24 to 2024/25
Organisation Emissions	Energy, Offices and Operational Depots Planning	3	Upgrade Traffic Management Systems High Intensity lamps to L.E.D., and change operations to low voltage where practicable.	A 3-year programme commenced in 23/24, to convert all outstanding High Intensity lamps to L.E.D. Ongoing systematic implementation of Extra Low Voltage operations where practicable.
Organisation Emissions	Energy, Offices and Operational Depots Planning	4	Implement energy efficient measures in offices and depots to reduce the amount of energy we consume; i.e. control lighting levels and manage lighting times, ensure computers and other appliances are switched off when not in use. Implement this through a managed plan. Also reduce office space when viable by continuing to support working from home. Include the potential to reduce operational depots.	End of 2024/25
Organisation Emissions	Energy, Offices and Operational Depots Planning	5	Investigate viability to phase out gas heating in offices and depots and switch to heating using renewable sources. Prepare business case to petition ECC for required investment. Note that solar panels are already used in some of our operational depots for heating water.	End of 2025/26

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Energy, Offices and Operational Depots Planning	6	Explore options for energy management at operational depots; i.e. investigate viability of generating our own electricity including whether practicable or necessary to store energy on site. Note that solar panels are already used in some of our operational depots for heating water, explore potential for additional installations, and if viable prepare business case to explore availability of external funding in the first instance.	End of 2025/26
Energy, Offices and Operational Depots Planning	7	Links with 6. above. Investigate the possibility of harvesting energy by converting vehicle vibrations from traffic driving over our road network. This requires piezoelectric crystals to be laid under the asphalt when road surfaces are constructed or renewed. The crystals have a special property that converts mechanical energy into an electric voltage as they're distorted by passing traffic.	End of 2026/27
Energy, Offices and Operational Depots Planning	8	Explore potential to move from generator driven power tools to battery operated hand tools or use of solar to provide energy for site lighting, signage, Close Circuit Television (CCTV) and welfare facilities. Explore potential for solar or solar/hybrid generators. If viable, prepare business case to petition ECC for required investment based on recommended programme. Links with Maintenance.	End of 2024/25
Energy, Offices and Operational Depots Planning	9	Solar power is already being used at the road side for powering some assets. Explore opportunities to extend use of road side solar power - not just for providing energy to assets but wider applications.	End of 2025/26
Energy, Offices and Operational Depots Planning	10	Determine if an Energy Savings Opportunity Scheme (Esos) facilities assessment of our offices and operational depots, relating to energy use, has been carried out, and if so, review any recommendations for improvement and subsume within this Strategy.	End of 2024/25
Energy, Offices and Operational Depots Planning	11	Embed a culture of energy efficient awareness, to promote ongoing scrutiny of all highway related activities and services to identify and implement opportunities to replace energy intensive services and products with low energy products and services. Where this requires additional investment, prepare business case to explore availability of external funding in the first instance.	Ongoing for scrutinization of activities and services.

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Energy, Offices and Operational Depots Planning	12	Develop a waste management plan for every office and operational depot, with a view to reducing waste at all levels. Establish base line measurement, set annual performance targets for waste reduction, and measure and monitor performance. Where performance is at variance from target, investigate the matter fully and implement measures to redress the balance.	End of 2025/26
Low Carbon Emissions Materials Planning	1	Manage trial use of new, innovative materials and processes presented by service providers, through the technical working group. For example, low carbon cement can be up to 80% lower in embodied carbon compared to general cement. Explore increase in recycled aggregate content within asphalt mixes, and use of recycled or synthetic binders. Assess the benefits, risks and constraints associated with change, then implement as far as practicable where improvements in carbon reduction can be realised without financial burden or increase in risk to operatives or highway users. Ensure that the project management of trials avoids onerous administration and is adequately resourced so that results can be realised and communicated quickly. In the short term, significant changes which would result in value for money carbon reduction may be constrained due to existing contractual agreements. Determine a progressive programme for implementation which includes reference to the future highways service from 2027/28. Where this requires additional investment, prepare business case to explore availability of external funding in the first instance.	Ongoing
Low Carbon Emissions Materials Planning	2	Warm Mix asphalt is a lower carbon emissions alternative to general asphalt. 15.4% of asphalt specified in 2022/23 was warm mix, mostly for binder applications but trials have been undertaken with surface applications. Review results of warm mix for surface applications, and where practicable implement a programme for extending use of lower temperature asphalt across our network, including potential use for reactive works.	End of 2024/25

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Low Carbon Emissions Materials Planning	3	Construction Team (and Contractor where applicable) to work collaboratively with Designers to determine lower carbon emissions outcomes. Where designers identify opportunities to set limits upon the amount of carbon emissions that can be produced during the execution of the works based upon estimates made during the design phase, monitor progress towards achieving targets throughout the construction process and address variances collaboratively with the Design team. This will require Construction Team to disclose and monitor data on the actual materials and associated volumes, construction plant, fuel type and consumption rates, which are used during the execution of the works, to allow monitoring of progress against carbon emissions reduction targets.	End of 2024/25 for first carbon emissions estimate/target setting scheme, then Ongoing
Reducing Waste, and Recycling Planning	1	Investigate how removed road material can be used elsewhere; i.e. explore extending its current use and implement where practicable and affordable. Include potential for crushing and storing material for reuse as well as potential for selling material to external organisations for reuse.	Ongoing
Reducing Waste, and Recycling Planning	2	Determine a base line for % split between new and recycled materials. Review the Key Performance Indicator that measures % of recycled material used on the contract and investigate the possibility of setting more challenging targets to reduce new material use and associated vehicle movements.	End of 2024/25
Reducing Waste, and Recycling Planning	3	Explore how we could reuse materials being removed from sites, such as kerbs in good condition.	Ongoing
Reducing Waste, and Recycling Planning	4	Explore use of technology to estimate more accurately how much material we require for fixing localised defects etc., to minimise wastage, and explore the potential for re-using material that is surplus. Measure and record waste removed from site in terms of amount that is excavated and amount that is surplus new material and set target to reduce surplus new material.	End of 2024/25
Reducing Waste, and Recycling Planning	5	Undertake trial use of a mobile hot box to keep materials warm, to minimise waste. Review the results of the trial use and explore the potential for increased use where this is practicable and beneficial.	End of 2024/25

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Reducing Waste, and Recycling Planning	6	Continue to support an organisation wide ban on use of single use plastics.	Ongoing
Reducing Waste, and Recycling Planning	7	Mandate that suppliers take back 'shrink wrap' and packaging to reuse or recycle.	Ongoing
Procurement and Supply Chain Planning	1	Work collaboratively with the Supply Chain to explore potential to purchase more sustainable and efficient products and services with the aim of achieving the best long-term, overall lowest whole life carbon cost where practicable and affordable	End of 2024/25 to start liaison with Supply Chain
Procurement and Supply Chain Planning	2	Encourage suppliers to provide Environmental Product Declarations (EPDs) for materials, that quantify their embedded carbon, to enable the most sustainable whole life option to be selected. Liaise collaboratively with the Design and Construction Teams to embed this approach.	End of 2024/25 for supply chain provision of EPDs where practicable. Ongoing for liaison with the Design and Construction Teams from time EPDs available.
Procurement and Supply Chain Planning	3	Encourage our suppliers to implement carbon management systems and to embed approaches that minimise carbon emissions.	End of 2024/25 for initial liaison and planning
Procurement and Supply Chain Planning	4	Encourage our supply chain partners to use the lowest form of feasible and available transport to reduce associated carbon emissions. Also encourage our suppliers to be involved in HGV alternative fuel trials and to be early adopters of zero carbon HGV technologies.	End of 2024/25
Procurement and Supply Chain Planning	5	Investigate carbon emissions for non-road maintenance materials, such as winter service precautionary salt, and identify and implement low carbon alternatives where these meet the safety and technical requirements and do not increase cost.	End of 2024/25

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Procurement and Supply Chain Planning	6	Where practicable, develop procurement guidance with the supply chain to promote the supply of low embedded carbon options for materials and services. Incentivise this approach where this is practicable within the current contract arrangements and provides value for money and significant carbon emissions reductions, and where there are clear benefits to all parties.	End of 2024/25
Procurement and Supply Chain Planning	7	Where practicable, work collaboratively with the Supply Chain to develop net zero plans for key construction materials and services. This could include plans for inseting and offsetting residual carbon emissions.	End of 2024/25 for initial discussions, then Ongoing for implementation
Procurement and Supply Chain Planning	8	Where practicable, map the current distances travelled from our suppliers to operational depots and sites. This will allow us to consider more local suppliers within our current contractual framework, to reduce our emissions moving forward.	End of 2024/25 for initial data collection, then Ongoing for implementation
Procurement and Supply Chain Planning	9	Engage in Early Contractor Involvement (ECI) and soft-market testing during the procurement process to ascertain how carbon emissions may be reduced and learn about any advances in materials and processes. Make Technical Working Group aware of advances in materials and processes so that trials can be undertaken.	End of 2024/25 for initial liaison and planning
Procurement and Supply Chain Planning	10	Use our understanding of carbon content of treatment materials to move to a position where we are selecting materials based on the benefits of their whole life carbon emissions reduction, subject to outcome of trial use of new materials and agreement by ECC to any increases in financial costs which must be subsumed within existing allocations. This will support ECC's Incentive Fund Band 3 status if Incentive Fund rehabilitated.	End of 2024/25
Maintenance and Construction Planning	1	Be familiar with the carbon management process PAS2080 methodology and collaborate with others to implement practices which reflect its key principles, including lean practices and principles of the circular economy.	Ongoing

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Maintenance and Construction Planning	2	Establish early collaboration between the Design Team and Construction Team to consider carbon emissions reductions identified by the designer, or to share ideas for potential carbon emissions savings, or to discuss feasibility of any carbon emissions limits imposed on scheme by designer.	End of 2024/25
Maintenance and Construction Planning	3	Explore use of solar powered or hybrid generators to provide energy for site lighting, signage, Close Circuit Television (CCTV) and welfare facilities. Links with energy.	End of 2024/25
Maintenance and Construction Planning	4	Construction Team to work collaboratively with Designers to determine lower carbon emissions outcomes. Where designers identify opportunities to set limits upon the amount of carbon emissions that can be produced during the execution of the works based upon estimates made during the design phase, Construction Team will be required to monitor progress towards achieving targets throughout the construction process and address variances collaboratively with the Design team. This will require Construction Team to disclose and monitor data on the actual materials and associated volumes, construction plant, fuel type and consumption rates, which are used during the execution of the works, to allow monitoring of progress against carbon emissions reduction targets.	2024/25
Maintenance and Construction Planning	5	Explore potential for reducing emissions from construction on our sites. Work more efficiently, cut journeys and reduce material use. Availability of zero emission construction machinery and construction compounds is increasing as manufacturers innovate. Work with our supply chain to trial net zero emission plant on our schemes and investigate the possibility of undertaking a net zero trial scheme. This could include exploring the potential to reduce the distances travelled to transport materials to and from site, and it could also include plans for inseting or offsetting residual carbon emissions.	End of 2024/25
Maintenance and Construction Planning	6	Ensure revenue maintenance activities are considered for whole life carbon emissions reduction and CO2e measurement, as well as programmed works.	End of 2024/25

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Maintenance and Construction Planning	7	Develop a waste management plan for every scheme, with a view to reducing waste at all levels. When feasible, establish base line measurement for waste for each asset group for each annual programme of works, set annual performance targets for waste reduction, and measure and monitor performance. Where performance is at variance from target, investigate the matter fully and implement measures to redress the balance. Targets may need to be based on volume of works which will vary annually.	2025/26
Reducing Road User Demand Planning	1	Promote sustainable transport and active travel to reduce congestion. We need to embrace a shift in attitude towards active and sustainable modes of transport such as walking, cycling, and taking the bus or train to encourage their use and reduce pollution and congestion. Continue to develop, well-planned cycling and walking routes across all urban and rural locations and to all public transport hubs. Where possible link cycle routes to the National Cycle Network. Work with businesses and transport companies to improve onsite cycling facilities. Improve the reliability and quality of sustainable transport – bus back better government initiative and ECC bus service improvement plan. Continue to promote the use of Park and Ride as a stepping-stone to more widespread public transport use.	Ongoing
Reducing Road User Demand Planning	2	For active travel schemes to be useable all year round, schemes will need to be supported with efficient and resilient drainage solutions.	Ongoing
Reducing Road User Demand Planning	3	Reduce need for travelling. Our transport emissions are higher than the national average. Encourage residents to avoid or reduce unnecessary private car journeys. Continue to promote 'destination shifting'; i.e. working from home or using local shops rather than driving to out of town retail parks. Promote changes in residents' behaviour to question not only the way we travel but also why we are travelling.	Ongoing

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Reducing Road User Demand Planning	4	Where road journeys are essential, improve vehicle efficiency by making alternatively fuelled options, such as electric vehicles (EVs), easier to run for both personal and professional use. To facilitate this, promote the need for an increase in the number of EV Rapid charging points on the network. The Geospatial Commission has published a report to support local authorities to make decisions about where to install electric vehicle (EV) charge points in their areas. Also explore new technology for wireless charging being developed by Eurovia and potential for its implementation. Also promote the need for increase in availability of alternative fuels across the county. Encourage uptake of shared vehicle mobility.	Ongoing for promoting need for EV charge points. Explore viability of implementing wireless EV charging by 2025/26
Reducing Road User Demand Planning	5	Investigate theory of increasing capacity on existing roads through improved traffic management; i.e. implement network wide traffic management efficiency review. Identify programme of required changes, and prepare business case to explore availability of external funding in the first instance.	End of 2024/25 for review. End of 2025/26 for business case to implement changes
Reducing Road User Demand Planning	6	Explore and develop network connectivity to support connected and autonomous vehicles which will improve capacity through improved traffic management and better use of road space. Vehicle platooning is part of a suite of features that self-driving cars might employ. A platoon is a group of vehicles that can travel very closely together, safely at high speed. Each vehicle communicates with the other vehicles in the platoon.	Ongoing
CO2e Insetting and Offsetting Planning	1	Continue to support the Green Streets initiative by identifying new tree planting opportunities in the Highways and wider ECC estate. This will include replacing recently felled trees on the highway network and the creation of tree lined streets and roads by retrofitting trees, in accordance with the tree planting principles in the tree plan.	Ongoing
Improving Green Infrastructure and Local Nature Recovery Planning	1	Review our grass cutting schedule with a view to implementing a regime that will encourage wildflower growth as well as improve green infrastructure connectivity.	2025/26

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Improving Green Infrastructure and Local Nature Recovery Planning	2	Investigate wildflower planting, such that locations and species will complement ECC plans for Local Nature Recovery	2025/26
Improving Green Infrastructure and Local Nature Recovery Planning	3	Work with external organisations to explore the potential for installing amphibian ladders in gullies at key locations, as well as implementing animal tunnels on new schemes where this would be practicable and beneficial	2025/26
Improving Green Infrastructure and Local Nature Recovery Planning	4	Review our existing requirements for Otter shelves on structures, and identify any new asset requirements and highlight where existing assets may require replacement	2025/26
Improving Green Infrastructure and Local Nature Recovery Planning	5	Investigate the potential for managing surface water through the installation of 'rain gardens' or other sustainable drainage solutions. For example, 'rain gardens' could be installed in the highway verge or installed in highway verge 'build outs' which are designed to restrict road width to act as traffic calming measures. These measures will enhance biodiversity and local nature recovery.	2025/26
Improving Green Infrastructure and Local Nature Recovery Planning	6	Investigate the potential for the creation of 'green bridges' that cross over the road to link green infrastructure and pathway connections, and create a safe crossing point for wildlife movement.	2025/26
Essex Water Strategy Planning	1	Public services to consider the reuse of water from Sustainable Urban Drainage Schemes (SUDS) systems when available as an alternative to freshwater supplies. For example, in Highways operational maintenance such as gully cleansing, street cleaning or gritting.	2025/26
Essex Water Strategy Planning	2	Anchor institutions, Essex Schools & Housing, and Essex Highways, to retrofit Sustainable Drainage Systems (SUDS) and Green Infrastructure to remove the impact of built environment and transport drainage on the ecological status of our waterbodies.	Ongoing
Essex Water Strategy Planning	3	Anchor institutions, Essex Schools & Housing, and Essex Highways, to ensure that they understand their current usage, identify leaks, and adopt water efficiency measures. Facilities should be 'smart metered' and leaks fixed as soon as practicable and affordable.	Ongoing

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Essex Water Strategy Planning	4	Consider the use of water within public service delivery and the feasibility of options for grey and rainwater recycling. This may include retrofitting with water efficiency and water recycling measures.	2025/26
Essex Water Strategy Planning	5	Essex County Council and others to include water targets within their procurement sustainability charters and other strategies.	2025/26
Improving Green Infrastructure, Local Nature Recovery, and Water Management Planning	1	In striving for net zero, it is important that everyone involved in highway related activities acknowledges the complex interdependencies and synergies between decarbonisation and the other climate action emergencies and be committed to addressing these too. Promote this through communications programme and include in proposed web site pages to convey progress and celebrate successes	2024/25
Improving Green Infrastructure, Local Nature Recovery, and Water Management Planning	2	Continue promoting the 'Safer, Greener and Healthier Travel' vision across the organisation through rolling out awareness training for all officers as well as securing appropriate, detailed training for designers.	Ongoing
Improving Green Infrastructure, Local Nature Recovery, and Water Management Planning	3	Establish 'palette' of actions for improvements that can be implemented at the Design stage for programmed works and determine a maintenance strategy to support the roll out of these improvements. This may require training maintenance staff in new skills. Also explore what improvements can be undertaken during reactive, environmental maintenance stages, although it is acknowledged that these may be limited.	2025/26
Improving Green Infrastructure, Local Nature Recovery, and Water Management Planning	4	ECC Essex Highways to maintain membership and attendance of Local Nature Recovery Work Groups and facilitate links between the Highways Green Estate and improvements required for green infrastructure, local nature recovery, water management and biodiversity.	Ongoing

Climate Action Activity	Climate Action Activity Number	Climate Action Activity Description	Climate Action Activity Timeline for Completion
Improving Green Infrastructure, Local Nature Recovery, and Water Management Planning	5	Explore retaining water through drainage schemes where appropriate, with a view to increasing water supply to the environment.	Ongoing
Improving Green Infrastructure, Local Nature Recovery, and Water Management Planning	6	Work collaboratively to assess the impact to Essex Highways of the requirement for a 10% biodiversity net gain on schemes requiring planning consent, which is expected to become law in January 2024. Also to assess impact of governments' plan to implement Schedule 3 to the Flood and Water Management Act 2010, expected during 2024, which will make sustainable drainage systems (SuDS) mandatory for new developments.	Ongoing
Improving Green Infrastructure, Local Nature Recovery, and Water Management Planning	7	Explore the potential requirement for Essex Highways to purchase Biodiversity Net Gain (BNG) credits. ECC has a project to enter BNG credit market through conversion of ECC owned land (pilot sites currently being explored by ECC)	Ongoing
Social Value Planning	1	Climate action is already one of central government's key social value priorities. Determine how social value is to be measured and recorded on the Essex Highways contract and explore potential for setting base line and improvement targets.	2025/26
Social Value Planning	2	It is important for everyone involved in highway related activities to be aware of the social value associated with climate action, and to be committed to measuring and recording social value benefits in accordance with any initiatives to set social value base lines or improvement targets. Promote this through a communications programme and include in proposed web site pages to convey progress to net zero and celebration of successes.	2025/26

Glossary

100% Electric is a vehicle which operates solely via electricity.

Anchor Institutions. These are large scale employers, the largest purchasers of goods and services in the locality, controlling large areas of land and/or having relatively fixed assets.

Biofuel is any fuel that is derived from biomass — that is, plant or algae material or animal waste. Since such feedstock material can be replenished readily, biofuel is considered to be a source of renewable energy, unlike fossil fuels such as petroleum, coal, and natural gas.

Carbon cycle. Carbon is constantly cycled between the environment and organisms, and the primary function of the carbon cycle is to maintain the balance of carbon in nature and sustain life on earth. Since the industrial revolution, however, the amount of carbon dioxide in the atmosphere has increased beyond the rate of carbon absorption, primarily due to the burning of fossil fuels, and the carbon cycle has become out of balance.

Carbon dioxide equivalent (CO₂ e). CO₂e is the unit for comparing the radiative forcing of greenhouse gases (GHGs) to carbon dioxide. The carbon dioxide equivalent is calculated using the mass of a given GHG multiplied by its global warming potential.

Carbon Emissions Reduction is the quantified decrease in greenhouse gas emissions specifically related to or arising from an activity between two points in time or relative to a baseline.

Carbon Insetting is generally recognised as the term given to carbon reduction through the implementation of nature-based solutions for those that have the capacity to do so this within their own estate.

Carbon Management. This is the assessment, reduction and removal of greenhouse gas emissions during the planning, optioneering, design, delivery, operation, use, end of life (and beyond) of new, or the management of existing, assets, networks and/or systems.

Carbon Offsetting is the discrete reduction in greenhouse gas emissions not arising from the defined subject, made available in the form of a carbon credit meeting a defined set of requirements (as per PAS 2060:2014) and used to counteract emissions from the defined subject. The term 'offsetting' is generally given to the activity of organisations that do not have capacity to implement any kind of nature-based solution with their own estate, so instead fund nature-based solutions to be undertaken elsewhere, such as the purchase of carbon credits.

Carbon Reduction (or Carbon Emissions Reduction) is the process of minimizing greenhouse gas emissions in the development of new, or the refurbishment of existing, assets or networks.

Circular Economy. A circular economy favours activities that preserve value in the form of energy, labour, and materials. This means designing for durability, reuse, remanufacturing, and recycling to keep products, components, and materials circulating in the economy.

Commuted Sums. This is funding for inspection and maintenance of assets over a defined period, paid by a developer to the Local Authority who adopts the assets which then become maintainable at public expense.

Converting traffic vibrations into energy. Engineers from a UK university are working on smart materials such as ‘piezoelectric’ ceramics that when embedded in road surfaces would be able to harvest and convert vehicle vibration into electrical energy. The research project will design and optimise energy recovery of around one to two Megawatts per kilometre under ‘normal’ traffic volumes – which is around 2,000 to 3,000 cars an hour. This amount of energy, when stored, is the amount needed to power between 2,000 and 4,000 streetlamps. As well as providing environmental benefits, this would also deliver significant costs savings for taxpayers.

Decarbonisation is a process by which organisations, sectors or other entities aim to achieve zero fossil carbon emissions, typically referring to a reduction of the carbon emissions associated with key sectors, such as electricity, industry and transport.

Embodied Carbon. This refers to the emissions of greenhouse gases arising from: the sourcing and extraction of raw materials needed to build the project; the energy needed to process those raw materials in construction components (i.e. the manufacturing stage); the transporting of those building materials; and the construction activities themselves from construction plant, through to worker accommodation and transport. Embodied carbon is often referred to as supply chain carbon, or construction carbon, and is sometimes considered separately from operational emissions that refer to the emissions of greenhouse gases arising as a result of the operation of a development.

End of Life is the stage which begins when the asset has reached the end of its design life and is ready for refurbishment, retrofit, disposal, dismantling, etc., and ends when the asset is recycled, reused, recovered, or returned to nature.

Energy Savings Opportunity Scheme (ESOS) is a mandatory energy assessment scheme for organisations in the UK that meet the qualification criteria. The Environment Agency is the UK scheme administrator. ESOS applies to large UK undertakings and their corporate groups. It mainly affects businesses but can also apply to not-for-profit bodies and any other non-public sector undertakings that are large enough to meet the qualification criteria. Organisations that qualify for ESOS must carry out ESOS assessments every 4 years. These assessments are audits of the energy used by their buildings, industrial processes, and transport to identify cost-effective energy saving measures.

Energy Supply Issues. In the context of this Strategy, refers to fundamental power supply issue that may be prohibiting installation of Electric Vehicle charges. To resolve this would likely require the need to increase incoming supply. A **Load Management System** is a system that works out what needs power and when and manages the load.

Environmental Product Declarations (EPD) enables manufacturers to optimise the impact of their products and market their carbon transparency. An EPD is usually valid for five years

and is generated according to the relevant standards. Construction EPDs are based on the ISO 14040/14044, ISO 14025, EN 15804 or ISO 21930 standards.

Financier (or investor) is an individual or organisation that holds financial equity or debt categorised as financial assets.

GeoPlace is a limited liability partnership owned equally by Local Government Association (LGA) and Ordnance Survey (SO). It is responsible for collating, managing, and maintaining the primary UK authoritative geospatial address and street data.

Greenhouse Effect. Carbon dioxide emissions trap the long wave radiations from the sun, acting as a thermostat for the planet when the carbon cycle is balanced. However, an excess of carbon dioxide in the atmosphere creates a 'greenhouse' effect that results in global warming. This is having a dramatic, negative impact on the environment, through climate change, such that sustained existence of human life is now under threat.

Green Estate. Highways green estate relates to verges, hedgerows, trees, public rights of way, and premises.

Greenhouse Gas (GHG) Assessment is the process of calculating the total amount of GHG emissions and removals due to the delivery, use, operation, maintenance, demolition and/or reuse of assets and/or networks'

Greenhouse Gases (GHGs) are gases in the earth's atmosphere that trap heat. The gaseous constituents of the atmosphere, natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere and clouds.

Greenhouse gases. Notably these are carbon dioxide, methane, nitrous oxide, hydro-fluorocarbons, perfluorocarbons, nitrogen trifluoride, sulphur hexafluoride. Greenhouse gas emissions (CO₂e) are produced by many different sectors within the county: agriculture, mining and quarrying, manufacturing, electricity, water supply, construction, transport etc.

HGV Trial. An HGV is a Heavy Goods Vehicle. The reference to Trial refers to a test study or pilot study to experiment with a new technology, in this case an experiment with a fuel that is a lower carbon alternative to a fossil fuel.

HVO Fuel is a hydro-treated vegetable oil; a paraffinic diesel fuel which is available in the UK and offers a significant reduction in net greenhouse gas emissions.

Hybrid refers to a vehicle or plant which operates on a combination of electricity and fuel.

Hydrogen. A fuel cell uses the chemical energy of hydrogen or other fuels to cleanly and efficiently produce electricity. If hydrogen is the fuel, the only products are electricity, water, and heat.

Infrastructure is the basic physical and organisational structures, facilities, equipment and services needed for the operation of an organisation, or the services and facilities necessary for an organisation to function.

Life Cycle is the consecutive and interlinked stages of a product, equipment or service, from raw material acquisition or generation from natural resources to design, production, transportation/delivery, use, end-of-life treatment and final disposal.

Nature-based Solutions are actions to protect, sustainably manage and restore natural or modified ecosystems, simultaneously providing human well-being and biodiversity benefits

Network is a combination of interconnected assets (buildings and infrastructure) that provide services (e.g. water, power, transport) to society as part of a wider system.

Net-Zero refers to the target of reducing the greenhouse gas emissions that cause global warming to zero by balancing the amount released into the atmosphere from sources with the amount removed and stored by carbon sinks. This is also described as ‘carbon neutrality’.

PAS2080 is not a British Standard, but in the absence of a relevant British Standard is a publicly available specification for whole life carbon management when delivering construction projects and programmes.

SuDS stands for Sustainable Urban Drainage System. Sustainable drainage systems aim to reduce the amount of runoff from a site. Key to this is to slow the flow of water, to allow it to infiltrate into the ground.

Supply Chain in the context of this Strategy is the term given to a list of approved suppliers, all of whom may be included within an overarching contractual agreement for supply of materials, goods and services.

Urban Heat Island Effect. An urban heat island occurs when a city experiences much warmer temperatures than nearby rural areas. The difference in temperature between urban and less-developed rural areas has to do with how well the surfaces in each environment absorb and hold heat.

Value Chain refers to the organisations and stakeholders involved in creating, operating and managing assets and/or networks.

Whole Life is the summation of greenhouse gas emissions and removals from all work stages of a project from design, production, transportation/delivery, use, end-of-life treatment and final disposal.