Lancashire County Council

Highway Decarbonisation Strategy

April 2022

www.lancashire.gov.uk

Lancashire County Council

Contents

Version Control

Version	Description	Author	Approver	Date
1	Highway Decarbonisation Strategy	Highways Asset Manager	Cabinet	07/04/22

Date of next review – April 2023

Executive Summary

Here at Lancashire County Council, we are helping to make Lancashire the best place to live, work, visit and prosper; in accordance with our corporate priorities for 2021-2025:

- Delivering better services
- Caring for the vulnerable
- Protecting our environment
- Supporting economic growth

This Highways Decarbonisation Strategy is endorsed by senior stakeholders and delivers on these corporate priorities, in particular the need to protect our environment by setting out our commitment towards achieving Net Zero from highways maintenance and highway related activities.

The table opposite summarises our Strategy Areas that have been developed to help deliver against these commitments.

In conjunction with this Highways Decarbonisation Strategy, further consideration should be given to enabling a wider strategic approach to reduce demand on the highway network by promoting active travel and considering appropriate use of and provision of the highway. Also, utilising the replacement of the asset as an opportunity to review the existing suitability of provision with a view to installing a long-term sustainable highway provision.

	**Promoting low carbon approach in procurement of goods and services;** Stimulate innovation from our supply chain, by communicating our ambition and leveraging commercial incentives to take action.
	**Measure the carbon impact of all highway maintenance activities and publish carbon baseline and impact assessments;** so we can prioritise initiatives and continuously improve.
	**Aim for lowest carbon impact across the lifecycle of the asset;** by considering the impact of carbon in lifecycle modelling as part of the decision-making process.
	**Ensure the carbon impact of ongoing revenue maintenance activities are considered as well as replacement carbon costs;** achieving sustainability through durability.
	**Purchase of green energy [OM1];** buy 100% of our electricity via a certified renewables tariff.
	**Replace energy intensive services with low energy products and processes;** futureproof for evolving highways infrastructure and technology associated with a low carbon society.
	**Consider carbon off-setting as option of last resort;** Minimise dependency on offsetting and remain transparent on scope 3 emissions throughout the value chain.
	**Work towards Net Zero across all depots and fleet operations;** working collaboratively with other service lines.
	**Work with other stakeholders to consider innovation and develop low carbon initiatives across highway maintenance activities;** embed a decarbonisation culture with the necessary behaviours, roles and skill sets.
	**Consider the planting of trees within the highway boundary and measures to increase net biodiversity;** wherever appropriate.

Document Structure

This Highways Decarbonisation Strategy is structured into three tiers, as illustrated in Figure 1 below. These will be periodically reviewed and improved as new solutions become available and we progress on our decarbonisation journey. The guiding **strategy areas** represent our high-level commitment to decarbonisation and are endorsed by our senior management team. These set out our ambition and core themes underpinning the reduction of Green House Gases emissions from Highways activities. They define the boundaries of the Highways Decarbonisation Strategy scope and, in turn, the aspects that are within our control and influence.

The Highways Decarbonisation Strategy **principles and road map** describe how we will go about delivering Highways' contribution towards the Council's strategy that seeks to 'transition the Lancashire economy away from carbon by 2030 and address the biodiversity crisis' Initially, we must acknowledge the successes already achieved, such as LED street lighting, and communicate these as part of the ongoing need to raise awareness amongst our staff and Members.

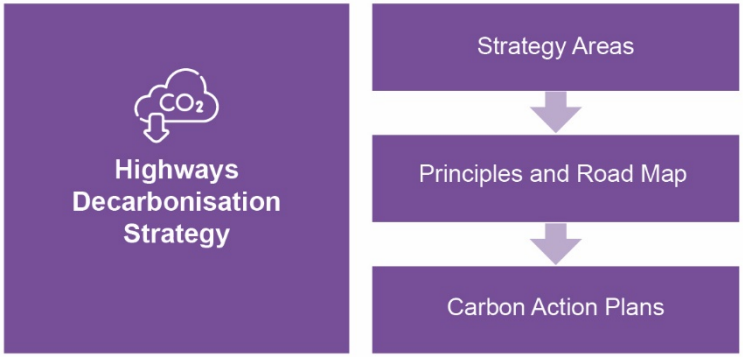


Figure 1: HDS Structure

In the shorter term, we must be proactive in targeting 'quick win' opportunities that reduce carbon in our day-to-day operations, particularly amongst the most energy intensive operations; reviewing our traditional highways operations and prioritising on activities that have the greatest source of carbon footprint. For example, pavement renewal and surface dressing. In parallel and over the longer term, we will collate data to baseline, set targets, measure and report carbon reduction. This will enable us to prioritise improvement initiatives and build a credible Highways Decarbonisation Strategy against which we can produce robust cost/carbon benefits cases that attract the necessary funding.

We recognise that people will be an essential component of our success and we are setting up new roles dedicated to the driving the necessary changes. Everyone has a part to play, and we must continually raise awareness, so staff understand the contribution they have to make in achieving decarbonisation efficiently. We will

collaborate externally by articulating our vision to the supply chain, empowering them to innovate into carbon reducing solutions. We will stimulate innovation from our supply chain, by communicating our ambition and leveraging commercial incentives to take action.

Finally, our **carbon action plan** sets out the specific initiatives that we will be pursuing up to 2035 (see Appendix A). These are governed as a programme, with a dedicated steering group, and aligned to the wider initiatives going on in the Council and Greater Lancashire Region. Prior to commencement, each initiative will be properly resourced, funded and have clearly defined benefits with an accountable owner.

Benefits of this Highways Decarbonisation Strategy

This Strategy sets the foundations for achieving for Highways contribution towards the Council's the strategy that seeks to 'transition the Lancashire economy away from carbon by 2030 and address the biodiversity crisis', by:

- Providing a structured and quantifiable route map for minimising scope 1,2 and 3 carbon emissions associated with highways asset management.
- Setting out a detailed and resourced action plan for the near term that enables the Council's longer term carbon reduction ambitions..
- Considering the existing maintenance backlog and utilise outputs from lifecycle modelling analysis.
- Analysing the carbon impact of planned versus reactive maintenance to inform business case and funding applications.
- Stimulating innovative thinking and appraise the risk/benefits of trying new product and approaches.
- Encouraging cultural change in which everyone takes responsibility for decarbonisation,
- Considering the cost of carbon reduction and provide procurement guidance and measures that incentivise the supply chain transparently and fairly.

The Department for Transport is increasingly placing greater emphasis on business cases that promote carbon reduction and we can attract additional funding by implementing a Highways Decarbonisation Strategy. It is also anticipated that scope of the Department for Transport self-assessment questionnaire for incentive funding will be expanded shortly to also include decarbonisation within lifecycle planning and enhancement of net biodiversity. We are currently waiting for guidance on this and on indicative funding levels for 2022/23 and beyond. The Highways Decarbonisation Strategy will ensure that we put the necessary procedures in place to collect robust evidence in respect of these new areas so that we can retain our Band 3 status.

In order to achieve these objectives decarbonisation needs to be engrained throughout the culture of the Council, by empowering our staff to take steps every day in the way they work to reduce

our carbon footprint and save money. We will raise awareness by publishing this Highways Decarbonisation Strategy, collaborating with stakeholders and celebrating successes.

1 – Context

Background

Here at Lancashire County Council, we are helping to make Lancashire the best place to live, work, visit and prosper.

This Highways Decarbonisation Strategy delivers on these ambitions by setting out our commitment towards decarbonisation from highways maintenance and highway related activities.

In December 2020, Full Council adopted a resolution to set out on an ambitious carbon reduction and nature recovery strategy that seeks to 'transition the Lancashire economy away from carbon by 2030 and address the biodiversity crisis'.

In June 2021 the UK government amended the Climate Change Act 2008 with the Carbon Budget Order 2021. This set the UK target of cutting net emissions to 78% by 2035 compared to 1990 levels. This target will be used as a starting point for the Highways Decarbonisation Strategy; however it will be reviewed when a corporate target is subsequently agreed. This strategy supports the corporate priorities for 2021-2025, as set out in the following table:

Corporate Priority	Highways Decarbonisation Strategy
Delivering better services	By building decarbonisation into the Transport Asset Management Plan approach, and considering the lifecycle of the asset, will ensure sustainability through durability and that best value and least disruption is delivered for everyone.
Caring for the vulnerable	By building decarbonisation into the Transport Asset Management Plan approach will ensure all decisions are based on assessment of asset condition and strategic importance and are therefore equitable.
Protecting our environment	Ensure carbon is considered in all decisions and were possible schemes and activities have low carbon impact
Supporting economic growth	Ensure support is given so that carbon impact is considered, and low carbon activities and products used in developing the infrastructure

Progress has already been made. Work is nearing completion to convert all of our 152,000 streetlights to LED. Since 2009 the county council has cumulatively:

- Reduced carbon emissions by over 86,400 tonnes,
- Reduced energy consumption by over 48,189MWh
- Saved almost £40m in energy costs

Acknowledging Success in Highways

We recognised that the planned highway capital surfacing programme is a highly carbon intensive programme and have begun a journey to ascertain the carbon output of our planned carriageway surfacing programme. We are measuring reduction in carbon outputs and developing tools to allow us to integrate carbon usage into the asset lifecycle modelling.

The introduction of warm mix asphalt saved 94 tonnes of CO_2e last year, while the trialling of foam mixed recycled asphalt saved 97 tonnes. The expansion of the use of foam mix asphalt in 2021 has resulted in a year-to-date reduction in CO_2e of 144 tonnes. The ongoing use of the in-situ recycling process also provides significant CO_2e savings.

Monitoring of further opportunities to reduce CO_2e emissions associated with the highway capital surfacing programme is ongoing. This includes increasing the recycled aggregate content within asphalt mixes, use of recycled or synthetic binders and additives and alternative manufactured aggregates, all of which are actively being explored.

Monitoring of further opportunities to reduce CO_2e emissions associated with the highway capital surfacing programme is ongoing. This includes increasing the recycled aggregate content within asphalt mixes, use of recycled or synthetic binders and additives and alternative manufactured aggregates, all of which are actively being explored.

Our objectives in undertaking this approach are to understand the CO_2e of different products and process, and to inform the decision-making process when it comes to choice of materials, treatments and intervention timing. With the overall aim to reduce CO_2e of the highway surfacing programme both in the immediate term and whole life cycle.

Scope

Decarbonisation is a very broad topic and without a clear scope, the development of a Highways Decarbonisation Strategy can easily drift and stifle progress. For this reason, we have defined the ‘spheres of influence’ of the Council’s Highways function, to focus effort on services that are within the Teams direct control.

It is intended to produce a co-ordinated approach across the whole Authority and the associated initiatives across the wider organisation. Figure 2 illustrates the top-down influences from global, national and regional levels on the Highways Decarbonisation Strategy. It also represents the more critical ‘peer’ service lines that are most critical to Highways, including depots, fleet, major projects and procurement.

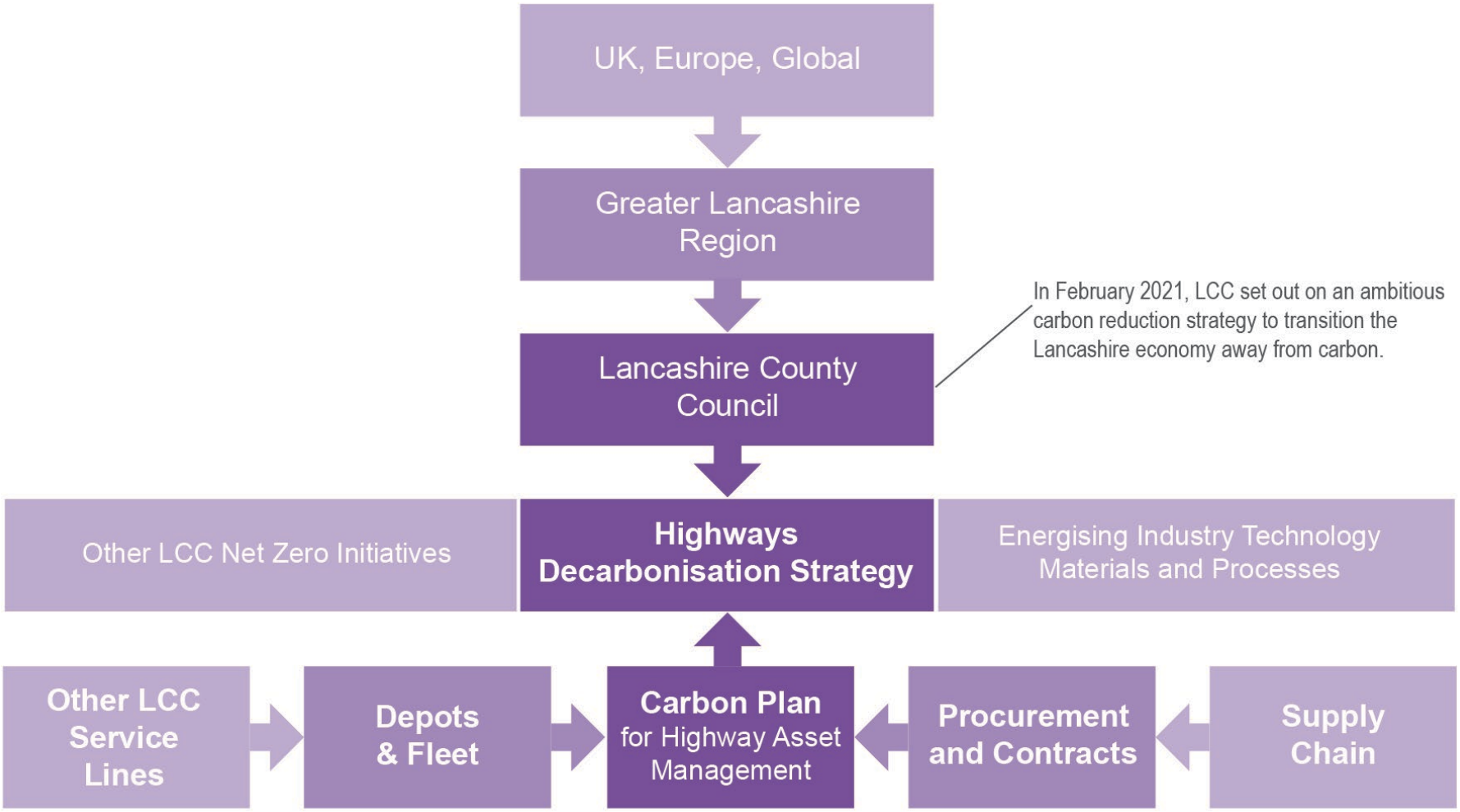


Figure 2: Sphere of control and influence of the HDS

Our carbon footprint consists of:

- Scope 1 emissions – heating and ventilation of our highways depot buildings and use of fleet vehicles
- Scope 2 emissions – electricity use for power and lighting (including street lighting)
- Scope 3 emissions – including business travel using staff's own vehicles, procurement of goods and services, waste and water use

We have direct control over and direct ways of measuring scope 1 and 2 emissions. This is also true of business travel in Scope 3.

We do not have such direct control over, nor currently, direct ways of measuring, many of the emissions in Scope 3. However, as set out below, we are seeking to address this.

The following list sets out the core activities covered within this issue of the Highways Decarbonisation Strategy.

- Capital renewals and improvements.
- Reactive and preventive maintenance.
- Inspections, surveys and condition monitoring.
- Winter service.
- Flooding and adverse weather.
- Incident response.
- Depots and equipment.
- Fleet.
- Major Schemes.
- Facilities and estates management (other buildings, out of scope for now).
- Resilience and contingency plans (out of scope for now).

Asset Management is more than just maintenance. The International Standard (ISO55000) describes it as an organisation wide decision-making framework, for assuring value to all of its stakeholders within the constraints (budget) available. Asset Management is predicated on aligning front line activity with higher level corporate objectives and considering the whole lifecycle of its asset portfolio. It also facilitates culture of systemic plan-do-check challenge which stimulate continuous improvement.

Adopting a Highways Asset Management approach can become a key enabler for steering the organisation towards its decarbonisation ambitions. It drives decisions on design, inspection regime, maintenance interventions, and materials selection, all of which drive their respective carbon footprint. Highway asset management carbon sources are mapped out in Figure 3.

This version of the Highways Decarbonisation Strategy does not aim to address network resilience or the impact of climate change, e.g., increased surface water/flooding or accelerating asset deterioration from freeze/thaw action.

Evolving changes in the highway's infrastructure (e.g. EV charging) or travel behaviours (e.g. modal shift and active travel) will become more prominent in later iterations of the Highways Decarbonisation Strategy.

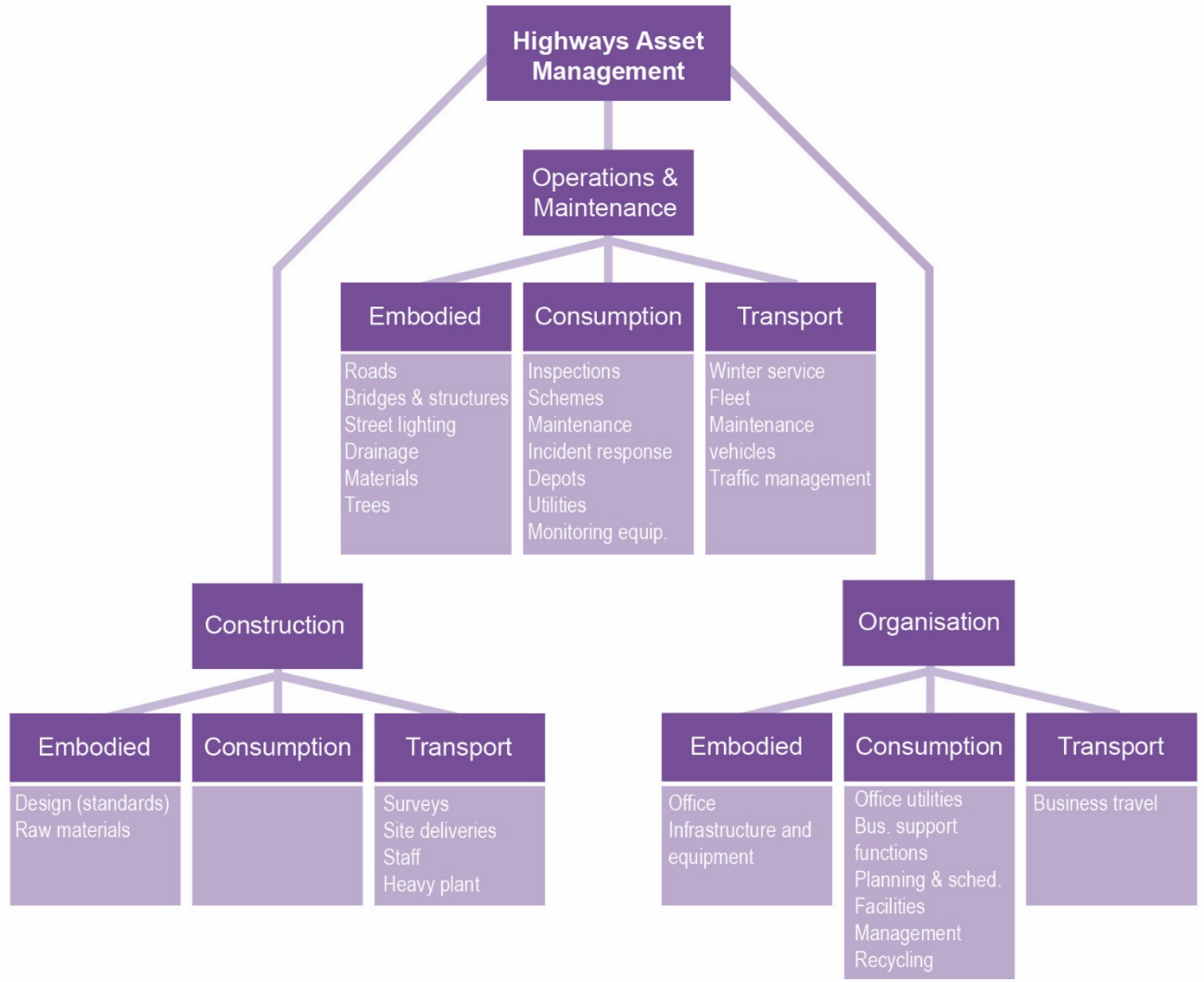


Figure 3: Mapping of Carbon Source

2 – Principles

Carbon Hierarchy

This Highways Decarbonisation Strategy follows the PAS2080 carbon emissions reduction hierarchy. Noting that the existing guidance focuses mainly on the design and construction stages of the asset lifecycle, we have adapted the principles to the context of operations and maintenance.

For example, 'build nothing' for an existing network infrastructure translates into 'life extension'. Furthermore, at end-of-life, we should challenge whether an asset is still needed to retain the required levels of customer service and if it can be removed rather than replaced. There may also be opportunities to change asset type or repurpose assets to reduce whole life carbon. For example, internally lit bollards at pedestrian crossings could be replaced with unlit retroreflective bollards.

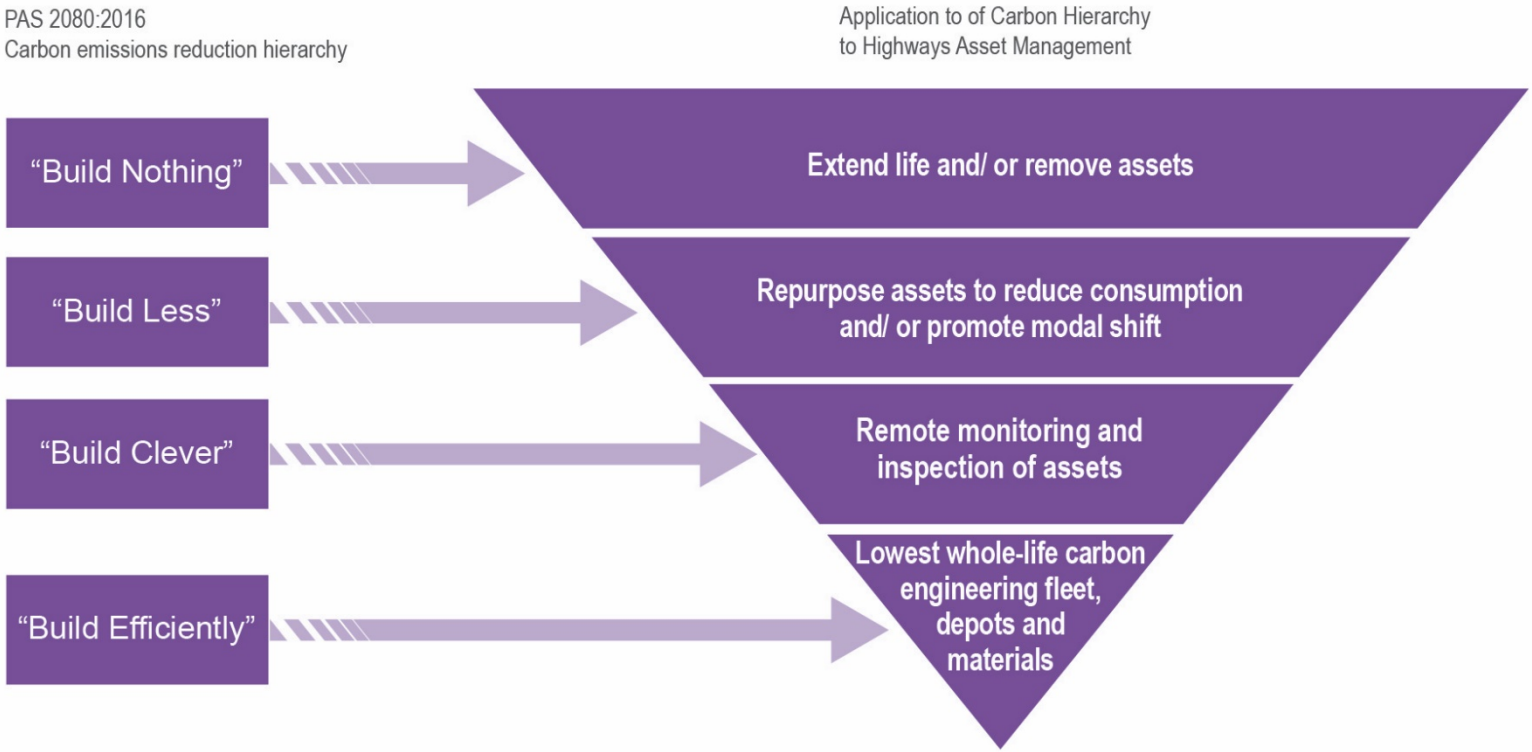


Figure 4: Carbon Hierarchy for Highways Asset Management

This 'carbon hierarchy for highways maintenance' provides an effective framework for challenging traditional working practices and support the decarbonisation targets. This thought process will become embedded within our asset management decision making. We will apply this carbon emissions reduction hierarchy to refresh our asset policies and specifications.

Our strategic approach is two-pronged. We are being proactive in targeting highest energy consumption activities in our day-to-day operations. In parallel, we are collating data to baseline, set targets, measure and report carbon reduction. This will enable us to prioritise improvement initiatives and build a credible Highways Decarbonisation Strategy against which we can produce robust cost/carbon benefits cases that attract the necessary funding.

Measuring and Baselining

We have identified the following suite of carbon reduction measures for highways maintenance. We accept that, with the current materials and technology available, we cannot achieve zero carbon in our highway's activities. We also need to address a maintenance backlog so have included a 'carbon savings' measure to ensure the drivers to reduce consumption are balanced against the need get repair and enhancement works delivered on the ground.

- Assets removed (quantity of annual maintenance and inspection eliminated)
- Asset life extension (whole-life CO2e avoided, not just deferred)
- Assets repurposed (reduction in maintenance need and/or modal shift encouraged)
- Directly measurable footprint (e.g., reduction in car fuel usage from fewer journeys by using remote inspections)
- Indirectly measurable footprint (aspects our team make a contribution towards corporately but difficult to attribute to Highways, e.g., office heating bills)
- Carbon savings (reduction in carbon emissions from improved materials and maintenance techniques)
- Awareness (the number of stakeholders bought and committed to our decarbonisation roadmap, e.g. measured through the NHT on-line survey)

As part of our Carbon Plan, we will develop the metrics and processes to report these measures and, in turn, manage the progress of the Highways Decarbonation Strategy. We recognise the principle of 'what gets measured gets done' but, equally, that we need to be pragmatic about the data available.

Maintenance Backlog

We have identified a suite of highways carbon reduction measures. In addition to measuring the carbon footprint of our maintenance operations, we have a 'carbon savings' measure to capture the reduction in carbon emissions achieved from deploying lower carbon materials and process. This measure will ensure the drivers to reduce consumption are balanced against the need get repair and enhancement works delivered on the

ground. We are therefore still incentivised to address the existing maintenance backlog, as 'carbon savings' score will increase in proportion to the volume of work undertaken

We are using undertaking whole life modelling analysis to evaluate the carriageway condition and future investment need. This enables us the develop long-term programmes and drive greater value from the funding available. It will also enable us to pre-empt future peaks and troughs in investment need, which we can smooth out across portfolio to optimise traffic management and minimise customer disruption. Once completed this work will inform future funding strategies.

By having longer term visibility, we can also engage the supply chain early and provide greater certainty of the forward works programme. By adapting our contracting approaches accordingly, we can stimulate industry to innovate and to deliver lower carbon solutions.

This approach to tackling the backlog is aligned to our Transport Asset Management Plan (TAMP) and its associated annual refresh.

Reporting

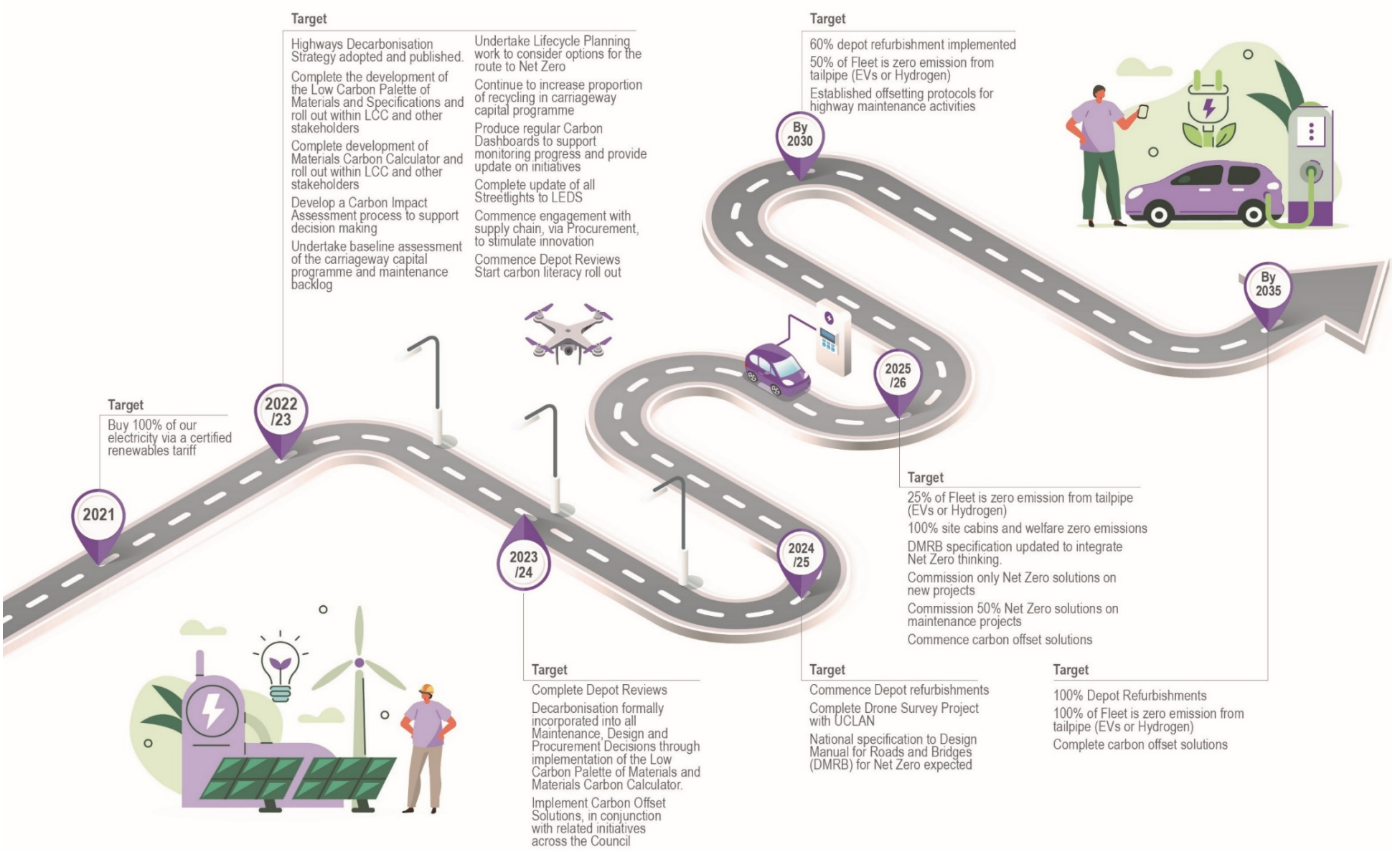
Whilst gathering momentum and over the longer term, we will collate data to baseline, set targets, measure and report carbon reduction. This will enable us to prioritise improvement initiatives and build a credible Highways Decarbonisation Strategy against which we can produce robust cost/carbon benefits cases that attract the necessary funding.

We will identify and source the information required to develop, implement and monitor this Highways Carbon Plan. Reporting will be done via Carbon Dashboard and developed to be included in the Transport Asset Management Plan. This document will be updated annually with details of the progress made in each of the action plans.

We will regularly update all related data collection processes, systems, training, and communications as part of our continuous improvement review cycles.

Highway Decarbonisation Road Map

The following table shows the proposed targets to be achieved in the major areas of Highways Asset Management leading up to 2035.


Target
Highways Decarbonisation Strategy adopted and published.
Complete the development of the Low Carbon Palette of Materials and Specifications and roll out within LCC and other stakeholders
Complete development of Materials Carbon Calculator and roll out within LCC and other stakeholders
Develop a Carbon Impact Assessment process to support decision making
Undertake baseline assessment of the carriageway capital programme and maintenance backlog
Undertake Lifecycle Planning work to consider options for the route to Net Zero
Continue to increase proportion of recycling in carriageway capital programme
Produce regular Carbon Dashboards to support monitoring progress and provide update on initiatives
Complete update of all Streetlights to LEDS
Commence engagement with supply chain, via Procurement, to stimulate innovation
Commence Depot Reviews
Start carbon literacy roll out
Target
60% depot refurbishment implemented
50% of Fleet is zero emission from tailpipe (EVs or Hydrogen)
Established offsetting protocols for highway maintenance activities
By 2030
By 2035
2025 /26
2022 /23
2021
2023 /24
2024 /25
Target
Buy 100% of our electricity via a certified renewables tariff
Target
25% of Fleet is zero emission from tailpipe (EVs or Hydrogen)
100% site cabins and welfare zero emissions
DMRB specification updated to integrate Net Zero thinking.
Commission only Net Zero solutions on new projects
Commission 50% Net Zero solutions on maintenance projects
Commence carbon offset solutions
Target
Complete Depot Reviews
Decarbonisation formally incorporated into all Maintenance, Design and Procurement Decisions through implementation of the Low Carbon Palette of Materials and Materials Carbon Calculator.
Implement Carbon Offset Solutions, in conjunction with related initiatives across the Council
Target
Commence Depot refurbishments
Complete Drone Survey Project with UCLAN
National specification to Design Manual for Roads and Bridges (DMRB) for Net Zero expected
Target
100% Depot Refurbishments
100% of Fleet is zero emission from tailpipe (EVs or Hydrogen)
Complete carbon offset solutions

Conclusions and Further Works

Financial investment is required to delivery this Strategy but, as has already been seen with the street lighting LED investment and the change to more durable resurfacing strategies, this investment will also return considerable financial savings in the future in terms of lower energy costs and lower maintenance costs.

The main outcomes of this strategy will be:

- Baselined Highways carbon footprint and embedded systems for monitoring and reduction.
- Embedded whole-life carbon models to prioritise, quantify and resource our Net zero pathway.
- Supply chain innovation, to stimulate technology advancements and identify new potential solutions to reduce carbon consumption without escalating cost.
- Engagement with stakeholders to ensure that the Highways Carbon Plan is supported and integrated into our corporate change management processes.
- Adoption of carbon hierarchy principles into our asset specific polices and standards so that carbon emissions and other environmental considerations are taken into account when decisions are made.
- Agreed approach for addressing the existing maintenance backlog and utilise outputs from lifecycle modelling analysis.
- Enhanced awareness and a cultural change in which everyone takes responsibility for decarbonisation.

To achieve these outcomes, decarbonisation will be engrained throughout the culture of the Council, by empowering our staff to take steps every day in the way they work to reduce our carbon footprint and save money. The following further works are proposed:

- Put actual values to the Low/Medium/High Carbon Savings.
- Put actual values to the Low/Medium/High Costs.
- Raise the awareness of the issue with briefings and training.
- Provide the Carbon Impact Assessment Toolkit to all Highways Teams.
- Roll out approach to other service lines.

Appendix A – Carbon Action Plans

This section sets out our ongoing carbon reduction activities for Highways Asset Management and related functions. This plan will undergo regular review and refinement as part of our overall management review cycle.

It is acknowledged that this Carbon Plan covers all service areas within Highways direct control and those identified as being able to influence towards the carbon reduction targets.

Action Plan 1 - **DIRECT CONTROL** - sets out the interventions that the Highways Asset Management Team intend to implement in order the lead the Highways service towards its decarbonisation targets.

Action Plan 2 - **INDIRECT CONTROL** - lists the interventions that the Highways Asset Management Team need to be implemented by other Lancashire County Council services.

Action Plan 3 - **INFLUENCE** - lists the interventions that Highways Asset Management Team need to be implemented by external organisations and service providers.

Emphasis on Action Plans 2 and 3 is placed on the need for collaboration and co-ordination between Highways Asset Management Team, other internal Highway Service providers and the external Supply Chain.

Appendix A1 - Action Plan 1 – Highways Asset Team Direct Control:

Owner: Highways Asset Manager

Principal Stakeholders: Highways Services, Design & Construction, Infrastructure Delivery

This Action Plan encourages consideration of whole life embodied carbon in maintenance standards and early in the design process.

Service Owner / Area	Intervention/Action	How?/Why?	Delivery Issues	Target Delivery Date	Carbon Savings Potential	Cost £	Update Direction of Travel
Asset	**Baselining** Capture differences between traditional approach vs new carbon saving approaches	Use 2020 Carbon Calculator data as baseline. Compare each project with the 2020 value to demonstrate carbon savings	None	2022/23	Pre-requisite for prioritising Carbon Plan initiatives	Low	2022/23 Carriageway Programme CO_2 savings statement produced 
Asset	**Lifecycle planning**	Undertake baseline assessment of the carriageway capital programme and maintenance backlog. Undertake. Lifecycle Planning (LCP) work to consider options for the route to Net Zero	None	2022/23	Pre-requisite for prioritising Carbon Plan initiatives	Low	Base line assessment started. LCP commissioned 

Service Owner / Area	Intervention/Action	How?/Why?	Delivery Issues	Target Delivery Date	Carbon Savings Potential	Cost £	Update Direction of Travel
Asset	**Materials Selection –** To be calculated on a project-by-project basis and saving reported quarterly; i.e. Traditional vs Whole Life Carbon approaches	Use Carbon Calculators at options stage of every project. Identify and implement lowest carbon option where budget allows. Ensure lowest carbon options are considered and visible in decision making	May be increased costs for low carbon solutions.	2022/23	High (if lowest whole life carbon options are chosen)	Very small to carry out the exercise.	Calculator being developed
Asset	**Materials Selection –** Sustainability through durability	Demonstrate whole life cost / carbon savings for more durable materials and processes. Costs/carbon to be evaluated at both project and portfolio levels	May be increased up front capital costs for more durable materials.	2022/23	Traditional approach vs whole-life savings to be reported quarterly.	Very small to carry out the exercise	Develop tools for options reports – eg bridges
Asset	**Materials Selection –** Palette of materials	Develop a *Palette of Materials* to recommend alternative low whole life carbon options	None anticipated	2022/23	None directly but essential for monitoring.	Low	Report approved March '22 Cabinet
Asset	**Materials Selection –** Development Control and Planning	Provide *Palette of Materials* for external organisations e.g. private developers, District Councils. Implement premium rates to discourage of high carbon options.	Resistance from developers and designers. Possible legal issues	2023/24	To be calculated on a project-by-project basis and savings reported annually	Low	Published following Cabinet approval March'22

Service Owner / Area	Intervention/Action	How?/Why?	Delivery Issues	Target Delivery Date	Carbon Savings Potential	Cost £	Update Direction of Travel
Asset	**Awareness –** Ensure technical teams have the appropriate skills to facilitate development of low carbon solutions.	Training sessions and supporting materials for Highways Operations and Design and Construction Staff in how to use the Carbon Calculator and palette of materials	Raise awareness through carbon working groups and 'champions' Align to personal development objectives	2023/24	None directly but essential for implementation of the Strategy	Low cost, but requires staff time input	Discussions started with Carbon Team and L&D 
Asset	**Extend Life / Repurpose / Remove Assets –** Application of carbon hierarchy for Highways Asset Management	When assets are in line for routine maintenance or renewal, consider whether the asset is actually required or if there is a lower carbon option. Examples could be the replacement of internally lit bollards at pedestrian crossings with unlit retroreflective bollards.	Alternatives must meet Highways requirements. May be difficult if impacts on customer perception or road safety feature.	2023/24 and ongoing	To be calculated on a project by project basis and saving reported quarterly	Very small to carry out the exercise. Costs to be calculated on a project by project basis	Integrate to the Impact Assessment template 
Asset	**Carbon Impact Assessment Toolkit**	Develop the toolkit to be used on all projects. Needs to be simple and scalable. Embed this in processes.	Time to develop toolkit.	2022/23	High	Low	Calculator being developed 

Service Owner / Area	Intervention/Action	How?/Why?	Delivery Issues	Target Delivery Date	Carbon Savings Potential	Cost £	Update Direction of Travel
Asset	**Awareness –** Culture Change	All works need to consider lifecycle costs, embodied carbon and maintainability early in the process. Leadership endorsement is required to drive that culture change that underpins the Highways Decarbonisation Strategy	Financial support and time to develop training tools.	2022/23	High	High	Starting to engage with all stakeholders 

Appendix A2 - Action Plan 2 A, B, C & D – Highways Asset Team Indirect Control

This action plan aims to cut Scope 1 and Scope 2 carbon emissions from the business functions within Lancashire County Council that the Asset Team depend upon to undertake their Highways responsibilities.

Service Owner / Area	Intervention/Action	How? / Why?	Delivery Issues	Target Delivery Date	Carbon Savings Potential	Cost £	Update Direction of Travel
Action Plan 2A Owner: Fleet Services Manager. Principal Stakeholders: Highways Services, Design & Construction, Infrastructure Delivery							
Fleet Services / Asset	**Baselining** Baseline carbon footprint	Fleet services carbon emissions should be easily quantifiable from fuel usage	None	2022/23	None but essential for monitoring	Low	
Fleet Services	**Reduce Fuel Consumption –** Move Fleet away from Petrol/Diesel towards alternative fuels such as Electric or Hydrogen	Fleet services to change to all (suitable) diesel vehicles to electric to minimise fossil fuel usage. EVs may not be the long term solution for vehicles, so risk of investment with only short term gain	Not all depots capable of supporting electric infrastructure required for an electric fleet. Capital funding. EVs currently up to three times more expensive than traditional vehicles. Revenue costs are lower.	2022-2035	High	High	Kickstart funding (£1.985m vehicles and £1m charging infrastructure for whole LCC not just Highways) Highways - Minimum of 2 vehicles and 2 charging points in each depot (7 depots) 

Service Owner / Area	Intervention/Action	How? / Why?	Delivery Issues	Target Delivery Date	Carbon Savings Potential	Cost £	Update Direction of Travel
Fleet Services	**Reduce Fuel Consumption –** Trial and promote new vehicle technology when it arrives on the market e.g. Hydrogen powered vehicles	Engage the vehicle and plant suppliers and get involved with trials.	There are risks associated with being early adopters of new technology.	2022-2035	High	High	Working group already in place for charging infrastructure between Fleet/Property and D&C
Fleet Services / Asset	**Reduce Fuel Consumption –** Transition Bridge Inspectors to electric vehicles	Change existing vehicles to electric at end of service life for Bridge Inspectors, Fleet Services also exploring possibility of home charging and fuel card type system for charging electric vehicles	Charging in depots may not be practical for size of fleet.	2022-2027	High (relative to existing vehicles)	High	Arranged for 1 (of 2) vehicles for delivery early in 2022/23 
Asset and all other Service areas	**Reduce Fuel Consumption –** Look at travel plans for site teams and personnel visiting site	Group together inspections to minimise travel. Provide electric pool vehicles for members of staff regularly traveling for work.	None	2022-2035	High	Low	

Service Owner / Area	Intervention/Action	How? / Why?	Delivery Issues	Target Delivery Date	Carbon Savings Potential	Cost £	Update Direction of Travel
Highway Operations	**Reduce Fuel Consumption –** Green scheduling of work/jobs to reduce carbon emissions through travel	Review end-to-end functions, such as winter service, and apply carbon hierarchy to identify carbon reduction opportunities.	May be difficult to implement.	2022-2035	Low	Low	
Fleet Services	**Reduce Fuel Consumption –** Masternaut Introduction	Introduction of latest version of Masternaut influences driver behaviour and can help make vehicle use more economic. Reports also collect data on usage which may enable more efficient use of vehicles.	No issues. Already being delivered. Approx. 95% already installed in highway fleet vehicles.	2022-23	Medium	Medium	Approx. 95% already installed in highway fleet vehicles 
Highway Operations	**Maintenance Process –** First time fix avoids duplicate visits	Avoiding multiple visits should reduce carbon cost.	Difficulty in ensuring maintenance solution is properly specified could be difficult if based on site reports.	2022-23	Low	Potentially high to resource	

Service Owner / Area	Intervention/Action	How? / Why?	Delivery Issues	Target Delivery Date	Carbon Savings Potential	Cost £	Update Direction of Travel
Action Plan 2B Owner: Property Asset Manager. Principal Stakeholders: Highways Services, Fleet Services							
Property Review (Asset Management)	**Facilities** Map energy efficiency of LCC operational highways and fleet depots and understand potential for improvement and target energy efficiency solutions	Survey and review depots, i.e. insulation, LED Lighting, PV Solar Panel, Heat Pumps, glazing. Identify Carbon savings that can be made to depot buildings. Improve energy efficiency of depots	Surveys already ongoing under One Public Estate	2023/24	To be reported upon following surveys, but expected to be high	High to be reported upon following surveys	
Action Plan 2C Owner: Planning Manager. Principal Stakeholders: Highways Services, Fleet Services, Asset Service							
Asset	**Repurpose Assets –** Application of carbon hierarchy for Highways Asset Management	Greener segregation, narrow roads, install cycleways. Consider low carbon options for every scheme.	Opportunity to tie into active travel funding application	2022-2035	Medium	Low	
Transport Planning	**Repurpose Assets –** Change Strategy on new roads to promote safer and more sustainable travel	Consider sustainable transport options such as public transport, cycling and walking for every scheme.	Opportunity to tie into active travel funding application	2025-2035	High	Low	

Service Owner / Area	Intervention/Action	How? / Why?	Delivery Issues	Target Delivery Date	Carbon Savings Potential	Cost £	Update Direction of Travel
Transport Planning	**Repurpose Assets –** Re-allocate road space. Eg. 15m road width reduced to 7.4m and cycle lanes installed.	Consider sustainable transport options such as public transport, cycling and walking during every scheme.	Opportunity to tie into active travel funding application	2022-2035	High	Low	
Action Plan 2D Owner: Carbon Asset Manager. Principal Stakeholders: Asset Service, Highways Services, Fleet Services							
Energy	**Green Energy –** LCC have already rolled out a corporate initiative in all LCC buildings except schools of purchasing	Purchasing energy from tariffs is one of the simplest ways to reduce Scope 3 emissions	Relies on the supply chain to provide green energy	Already in place	High	Premium but expect costs to reduce as green energy production becomes the norm	
Street Lighting Energy	**Green Energy –** LCC already on green energy tariff	Purchasing energy from tariffs is one of the simplest ways to reduce Scope 3 emissions	Relies on the supply chain to provide green energy	Already in place	High	Premium but expect costs to reduce as green energy production becomes the norm	

Appendix A3 - Action Plan 3 – Highways Asset Team Influence

Owner: Highways Asset Manager

Principal Stakeholders: Highways Services, Design & Construction, Infrastructure Delivery, Procurement

The emphasis in this plan is placed on the need for collaboration and co-ordination between Highways Asset Management Team, Highway Service Areas and the Supply Chain.

Service Owner / Area	Intervention/Action	How? / Why?	Delivery Issues	Target Delivery Date	Carbon Savings Potential	Cost £	Update Direction of Travel
Asset	**Innovation** – Surveys Working with Universities e.g. UCLAN to develop new technology	UCLAN/LCC joint project to develop a drone capable of carrying out Principal Bridge and Post Tensioned Bridge Inspections. This will replace the need for expensive access equipment and road closures to carry out surveys thus saving in carbon.	Unable to develop the technology to adequately replicate existing inspection techniques	2023/24	Indicative tCO2e per inspection?	£zero initially funded by the university	
Asset	**Innovation –** Materials Work with supply chain and local Universities	Tap into and promote innovation already being developed	Unable to develop the technology for use in materials	2023/24	Potentially high.	Currently unknown	

Service Owner / Area	Intervention/Action	How? / Why?	Delivery Issues	Target Delivery Date	Carbon Savings Potential	Cost £	Update Direction of Travel
Asset	**Recycled Materials**	Safeguard existing recycling capacity and support new aggregate recycling proposals. Need to find a way to engage with local suppliers to explain requirements to decarbonise the supply chain.	The Lancashire region has an abundance of locally sourced aggregates, so suppliers are not set up to provide recycled materials on the scale required. Also, levies imposed by government to discourage use of virgin materials are simply passed on to LCC as costs.	2022-2035	Indicative tCO_2e per t of recycled aggregate use	Initially may be high but should lead to costs returning to or ending up below current costs.	Framework currently being drafted 
Procurement	**Recycled Materials** – Local Materials	Incorporate Carbon Assessment into all procurement decisions. Apply penalties for failing to comply with tender	Needs a robust method of assessment that will stand up to legal challenge.	2023/24	Medium	Medium	
Procurement	**Innovation** – Supply Chain Incentivise Low Carbon Options	Collaborate externally by articulating our vision to the supply chain, empowering them to innovate and bring carbon reducing products to the market.	Needs a robust method of assessment that will stand up to legal challenge.	2022-2035	High	Initially high but reducing as low carbon options become the norm	

Service Owner / Area	Intervention/Action	How? / Why?	Delivery Issues	Target Delivery Date	Carbon Savings Potential	Cost £	Update Direction of Travel
All	**Collaboration –** Engage with local partners, such as District Councils and Local Enterprise Partnership	Continued liaison and consultation with these groups. Sharing of ideas, successes, and failures	Ensuring details are communicated with the correct departments. Avoid duplication of works.	2022-2035	High	Low to be members of these groups	
All	**Collaboration –** Engage with National Partners, such as the LCRIG, ADEPT and MSIG groups.	Continued Memberships of these groups. Consider proposals for Live Labs2	None anticipated	2022-2035	High	Low to be members of these groups	
All/Asset Lead	**Climate Change Adaptation –** Resilience Tool	Develop a climate change impact assessment tool and incorporate it into our processes so that carbon emissions and other environmental considerations are taken into account systematically within our Highways asset decision making	Will need to be incorporated into internal and external procedures and be robust enough to withstand scrutiny.	2022/23	High	Low	

Service Owner / Area	Intervention/Action	How?/Why?	Delivery Issues	Target Delivery Date	Carbon Savings Potential	Cost £	Update Direction of Travel
All	**Offset Carbon –** Carbon Storage Solutions (sequestering)	It is acknowledged that even implementing all the actions within this document achieving Net Zero will still be difficult and carbon offsetting will be required. The primary solutions recognised are Woodland and Peatland creation. Both these solutions will take time to grow into an offset fix.	Essential to start the offsetting process now rather than wait until the 2035 date to see how much remaining carbon there is to offset.	2022-2035	High	Medium	

Appendix B - Glossary of Terms

Scope 1	Direct Carbon Emissions
Fuel combustion	Includes boilers for heating buildings, gas furnaces and gas-fired combined heat and power (CHP) plants. The most common fuels are natural gas, liquified petroleum gas (LPG), gas oil (aka red diesel) and burning oil (aka kerosene)
Process emissions	Includes emissions release into the atmosphere during industrial processes, for example the production of carbon dioxide (CO2) as part of cement manufacturing
Company vehicles	All vehicles owned or leased by an organisation that burn fuels producing greenhouse gases fall into Scope 1. Typically, these will be cars, vans, trucks, and motorcycles powered by petrol or diesel engines. However, transport is changing. Alternative fuels, such as liquid petroleum gas (LPG) and liquefied natural gas (LNG) are being adopted, as are the biofuels; biodiesel and bioethanol. Full electric vehicles (EVs) and plug-in hybrids (PHEVs) are also becoming more popular. (The increasing use of electric vehicles could mean that some of an organisation's fleet will fall into scope 2).
Scope 2	Indirect Carbon Emissions
Purchased electricity, heat, and steam	Indirect emissions from the generation of purchased energy, from a utility provider
Scope 3	Emissions as a result of our operations that are outside of our direct control
Purchased goods and services.	Extraction, production, and transportation of goods and services purchased or acquired by the reporting company in the reporting year, not otherwise included in capital goods, fuel and energy related activities, upstream transportation and distribution, waste generated in operations, business travel, employee commuting and upstream leased assets.
Capital goods	Extraction, production, and transportation of capital goods purchased or acquired by the reporting company in the reporting year.
Fuel- and energy- related activities (not included in	Extraction, production, and transportation of fuels and energy purchased or acquired by the reporting company in the reporting year, not already accounted for in scope 1 or scope 2, including: a. Upstream emissions of purchased fuels (extraction, production, and transportation of fuels consumed by the reporting company

scope 1 or scope 2)	b. Upstream emissions of purchased electricity (extraction, production, and transportation of fuels consumed in the generation of electricity, steam, heating, and cooling consumed by the reporting company) c. Transmission and distribution (T&D) losses (generation of electricity, steam, heating, and cooling that is consumed (i.e., lost) in a T&D system) – reported by end user. d. Generation of purchased electricity that is sold to end users (generation of electricity, steam, heating, and cooling that is purchased by the reporting company and sold to end users) – reported by utility company or energy retailer only
Upstream transportation and distribution	Transportation and distribution of products purchased by the reporting company in the reporting year between a company's tier 1 suppliers and its own operations (in vehicles and facilities not owned or controlled by the reporting company) Transportation and distribution services purchased by the reporting company in the reporting year, including inbound logistics, outbound logistics (e.g., of sold products), and transportation and distribution between a company's own facilities (in vehicles and facilities not owned or controlled by the reporting company)
Waste generated in operations.	Disposal and treatment of waste generated in the reporting company's operations in the reporting year (in facilities not owned or controlled by the reporting company)
Business travel	Transportation of employees for business-related activities during the reporting year (in vehicles not owned or operated by the reporting company)
Employee commuting	Transportation of employees between their homes and their worksites during the reporting year (in vehicles not owned or operated by the reporting company)
Upstream leased assets	Operation of assets leased by the reporting company (lessee) in the reporting year and not included in scope 1 and scope 2 – reported by lessee.
Downstream transportation and distribution	Transportation and distribution of products sold by the reporting company in the reporting year between the reporting company's operations and the end consumer (if not paid for by the reporting company), including retail and storage (in vehicles and facilities not owned or controlled by the reporting company)
Processing of sold products.	Processing of intermediate products sold in the reporting year by downstream companies (e.g., manufacturers)

Use of sold products.	End use of goods and services sold by the reporting company in the reporting year.
End-of-life treatment of sold products.	Waste disposal and treatment of products sold by the reporting company (in the reporting year) at the end of their life.
Downstream leased assets	Operation of assets owned by the reporting company (lessor) and leased to other entities in the reporting year, not included in scope 1 and scope 2 –reported by lessor.
Franchises	Operation of franchises in the reporting year, not included in scope 1 and scope 2 – reported by franchisor

Appendix C - Related Materials

This strategy has been developed including reference to:

- PAS2080: 2016, Carbon Management in Infrastructure
- Taking Account of Carbon Reduction Plans in the Procurement of Major Government Contracts, 2021
- Climate Change Act 2008 (amended 2019) and the Orders made under it
- Lancashire Net-Zero Pathways, Options Reports, 2022
- Renewable Energy Deployment Opportunities Across Lancashire to 2030
- Lancashire Climate Resilience Study
- Lancashire State of the Environment Report 2021
- HM Government Net Zero Strategy: Build Back Greener
- Lancashire County Council Corporate Priorities 2021-2025 and Communications Strategy 2021-2025
- Climate Emergency Action Planning Guidance for asset owning organisations, Institute of Asset Management, 2021
- Decarbonisation Strategy: draft for consultation, Transport for the North, 2021
- Decarbonising Transport: A Better Greener Britain, Department for Transport, 2021
- Decarbonising Construction: Building a New Net Zero Industry, National Engineering Policy Centre, 2021
- Carbon Tool Guidance V2.3, Highways England, 2020