

Net Zero Corridors

Part of the Live Labs 2 Corridor & Place-Based Decarbonisation Consortium

OUTLINE BUSINESS CASE

FINAL SUBMISSION

Somerset Council



Cornwall Council



Hampshire County Council



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1 The Context

1.1. Restatement of the Elevator Pitch

We will pioneer the UK's first net zero emission roads in Somerset, Cornwall and Hampshire in nine 'Net Zero Corridors', which will act as a proxy for maintenance on all highways.

The diverse networks of these local authorities (including geographies, contracting models and material access) will ensure findings are representative of highway maintenance on each local authority road ecosystem. Using an iterative process, we will progressively decarbonise maintenance across the whole asset lifecycle. Corridors will be a test bed for innovation, circular solutions and new ways of thinking. Our approach will be underpinned by the Doughnut Economics Model, a framework that balances environmental and social needs to ensure wider impacts (such as on levelling up) are understood. Our consortium of partners will be open and collaborative, enabling the transformation of services on roads and other sectors globally.

1.2. Project Overview

The Wessex Partnership (Somerset Council, Cornwall Council and Hampshire County Council), Liverpool City Council, Devon County Council and their respective partners, sit within the wider corridor and the Place Based Decarbonisation Consortium. This Consortium is one of the four thematic areas within the overall Live Labs 2 programme. The Wessex (Somerset, Cornwall and Hampshire) Programme will broadly comprise the following:

- Project and programme management resource to deliver a three-year programme
- Delivery of demonstration projects over several years where planned, cyclical and reactive maintenance programmes will be challenged to deliver decarbonised solutions, aiming to get as close as reasonably possible to net zero emissions
- Differences in geography, access to materials and different contracting models will also be explored due to having three different authorities
- Innovation will be supplied by private sector partners including the term-maintenance, contractors for the authorities and Colas, who have helped coordinate this bid
- Live Labs funding will fund the 'extra-over' costs for achieving a greater level of carbon reduction than otherwise achievable under 'business as usual'. The expectation is that costs will reduce as new materials and methods normalise. The learning from the demonstrators will be captured in a decarbonisation toolkit
- Carbon analysis (baseline, optioneering, monitoring, certification and carbon budgeting) to further develop and optimise an emerging highway sector carbon analyser tool, developed by the Future Highways Research Group (FHRG).

Our Net Zero Corridors will be underpinned by the Doughnut Economics Model. Doughnut Economics is a ground-breaking model for sustainable development tested in Cornwall and Amsterdam, which balances environmental and social impacts, with the aim of meeting people's needs without overshooting Earth's ecological ceiling. In partnership with our academic partners, we will deliver two parallel projects to develop Doughnut Economics for the highways sector, at sector level, where we pilot the emerging sector approach and toolkit from DEAL, who are a member of the "learning circle" for this project, and at a geographic level, where we build on current and emerging DEAL toolkits/learning and apply to the Net Zero Corridors.

Doughnut Economics will provide a framework for decarbonising the sector while balancing the wider needs of communities, with a breadth of uses including policy making, procurement, performance monitoring and decision making. Further information on Doughnut Economics is available on the Doughnut Economics Action Lab (DEAL) website

<https://doughnuteconomics.org/about-doughnut-economics>

Best practice identified within our corridors and the Doughnut Economics Model will be integrated into 'business as usual' and adopted where appropriate and affordable by each authority.

Uniquely to our project, we will also develop the 'Future Highways Research Group (FHRG) Carbon Analyser' tool to include Doughnut Economics. Working in partnership with the FHRG, we

will build the model into the tool. This will ensure that when highways engineers are considering alternative approaches to current practice, carbon reduction is not considered in isolation but thought about within wider social, economic and environmental factors.

The three key elements of the project: Net Zero Corridors, Doughnut Economics and Carbon Accounting interlink, as set out in the Table 1a below.

Table 1a		
Element 1: Net Zero Corridors	Element 2: Doughnut Economics	Element 3: Carbon Accounting
<p>Net Zero Corridors will be a section of the local authority highway network. The aim of this Live Labs project is to target net zero carbon on our maintenance activities in these corridors within the three-year duration. The scope will include emissions created by design, construction, routine maintenance, reactive maintenance, cyclical maintenance, winter maintenance, operations and disposal. Each corridor will include one capital maintenance scheme during the project. Tailpipe emissions of vehicles using the corridor will be outside the scope of this project. The geographical scope of the corridors will be the highway boundary for the full length (of up to 25km). There will be up to nine Net Zero Corridors, ensuring a full representation of the overall local authority network. The nine corridors will include:</p> <ol style="list-style-type: none"> 1. A mix of urban and rural roads 2. A range of highway assets such as structures and drainage 3. Diversity in road classification and traffic flows 4. Various geographies covering coastal areas, forest and National Parks. <p>Within each corridor, we will make practical changes to aim to get as close as reasonably possible to net zero emissions. We will decarbonise the whole lifecycle of highway assets in the corridors, including trialling new materials and techniques. Where schemes are delivered in the corridors, we will embed decarbonisation in design, creating a road ready for the future.</p>	<p>We will apply the Doughnut Economics Model at both a local level and sector level by using and building on existing toolkits and learning from research partners DEAL and Circle Economy. At a local level, the Doughnut Economics Model will enable us to understand the environmental and social elements of highways in Somerset, Cornwall and Hampshire. We will apply learning to ensure that decarbonisation decisions reflect wider policy imperatives such as levelling up, environmental regulation, and social needs. The sector level will scale up the model from a local level to the wider highways sector – using DEAL’s emerging sectoral approach and toolkit. This will look specifically at how the highways sector can sustainably balance social and environmental factors.</p>	<p>We will conduct research into the measurement of carbon emissions in the highway sector. Our partner in this consortium, the Future Highways Research Group (FHRG), has developed a Carbon Analyser, which we will use to measure carbon emissions on the corridors. The FHRG will carry out the independent benchmarking of the corridors and annual waypoint assessments. The FHRG will build the Doughnut Economics Model into their carbon measurement tool to enable carbon reduction to be sustainable. In parallel, the University of Exeter will conduct research into carbon measurement with a particular focus on carbon budgeting and scenario planning.</p>
<p>Interlink between elements: Element 1 will interlink with the Doughnut Economics Model in Element 2, with the model providing a framework to sustainably balance environmental and social factors within the corridors. Element 1 will also interlink with Element 3. Learnings from our carbon measurement will support corridor decision making to target areas with the highest carbon footprint and evaluate potential solutions. Elements 2 and 3 will also interlink, with the Doughnut Economics Model built into the FHRG carbon tool.</p>		

2. The Strategic Case

2.1. How our Proposal meets Live Labs 2 Vision and Principles

Through deployments at demonstrable scale, we will achieve a step change in the normalisation and uptake of zero carbon techniques, solutions and materials in the local roads realm to meet the needs of today and prepare us for an uncertain tomorrow.

Our proposal to iteratively trial the decarbonisation of all the activities undertaken during highway maintenance using nine trial highway corridors, was designed to deliver the fundamentals of the Live Labs 2 vision.

The underlying principle for our proposal is that the nine corridor trials over the three years will be proxies for each authority's overall highway network, which in turn are proxies for the UK local highway network. The trial corridors were selected to be representative of the range and type of each authority's network. The total combined length of the three authority's networks is 22,800km which represents 6% of Britain's local highway network.

Using this information, and viewing the corridors as proxies, will enable the grossing up of the carbon savings achieved across the corridors to demonstrate the potential savings for each network, and the UK's total local highway network. Illustrative carbon and costs savings are set out in the Economic Case and will be developed in detail as part of the programme.

As Cornwall, Hampshire and Somerset are predominately rural counties, working at Consortium level with Liverpool City Council's project team will test the proposed interventions and initiatives. We are taking the approach that all carbon matters and are working with the FHRG to determine an initial carbon baseline for each corridor. Using the baseline analysis, we will target the 'carbon components' with the highest emissions first, then iteratively progress to the next highest emitters through the three-year period to trial; new processes, techniques, materials, data capture and behaviour change that are needed to reduce emissions from the baseline.

The FHRG Waypoint Assessments will support this iterative process, as set out in the Carbon Case Assurance Process (greater detail on the process and our approach to carbon is set out in the Carbon Case).

We will provide a commentary on each trial element and bank what works in a Carbon Toolkit, providing the sector with a manual for change.

We will take the dual approach of considering both individual elements (carbon components) and the whole system to drive emissions down and out of the maintenance lifecycle. We will investigate how the decision-making processes currently employed in determining annual maintenance programmes effect carbon emissions as well as the necessary changes in thinking, approach and behaviour that are required to further reduce emissions.

Where a trial element has proved inconclusive, or we have been unable to reduce a carbon component in the whole carbon maintenance lifecycle, we will report this with a commentary for the sector. We will take this forward and document what was considered, discounted and tested to extract the maximum value from the trials.

Each member of the Consortium has academic and research partners to address both the overall complexity of the task and to provide innovation and insight into specific carbon components of the whole carbon maintenance lifecycle. The consideration of circularity in materials use is a particular example where clients, contractors and manufacturers have achieved a certain level of decarbonisation collaboratively, but the potential exists for much higher re-use and recycling with this support from academic and research partners.

We will also test the long-term sustainability credentials of the new and novel materials and techniques we trial, using Doughnut Economics to prepare for an uncertain future.

2.2. Meeting National, Sub-National and Local Policies and Strategies

The work of the Live Lab aligns with wider national, sub-national and other local policies and strategies. For example, each authority has included a corridor that is identified by the National Infrastructure Commission as being most in need nationally of additional investment in connectivity to ensure places most in need are levelled up and not left behind economically. The following Table 2a sets out this alignment.

Table 2a	
Level	Policy/Strategy
National	
The UK Government has committed to the delivery of the United Nations Sustainable Development Goals. This includes ending the UK contribution to global warming by 2050 and reducing emissions in 2030 by at least 68% compared to 1990 levels through the UK's latest Nationally Determined Contribution.	
UK Net Zero Strategy – Build Back Greener, October 2021	Sets out the Government's vision for a market-led, technology- driven transition to decarbonise the UK economy and reach net zero by 2050.
Powering Up Britain – Net Zero Growth Plan, April 2023.	Notes under 'Innovation' that: 'Delivering net zero will require a step change in the rate of new technologies being developed, deployed to market and adopted by businesses and consumers. The Live Labs programme will be instrumental in delivering this outcome for the highways sector.
Decarbonising Transport. A Better Greener Britain, Department for Transport, July 2021.	Aims to develop a low-carbon trajectory for the UK's transport system to achieve net zero by 2050. Whilst it has a focus on tailpipe emissions, it does refer to wider Government efforts to reduce emissions from construction, as set out in the National Infrastructure Strategy and Construction Playbook.
National Infrastructure strategy, November 2020.	Sets out plans to transform UK infrastructure to level up the country, strengthen the Union and achieve net zero emissions by 2050. As part of a reform programme to achieve better, greener and faster infrastructure delivery, notes that the 'requirements of the net zero commitment will be embedded in every stage of the project life cycle and underpin decisions on the technical solutions chosen to achieve the required outcomes'.
Regional	
Peninsula Transport STB Vision 2022, and emerging Carbon Transition Strategy 2023.	The regional transport vision including the Somerset and Cornwall areas was published in 2022. One of five goals is to 'deliver affordable zero emissions transport for everyone'. Transition Strategy includes scenarios for transitioning to low carbon and net zero mobility futures including a phased plan outlining the steps required to achieve transition. The Live Labs programme will support delivery of these strategies.
Transport for the South-East Transport Strategy 2020	Regional transport strategy including the Hampshire area published in 2020 including a vision that 'by 2050, the South-East of England will be a leading global region for net zero carbon, sustainable economic growth'. The Live Labs programme will be important in achieving the strategic priority for 'a reduction in carbon emissions to net zero by 2050 at the latest, to minimise the contribution of transport and travel to climate change'.

Local	
Somerset Climate Emergency Strategy 2020 'Towards a Climate Resilient Somerset'	Joint Council Strategy to address climate change via three goals including decarbonising the local authority and wider public sector estates and reducing our carbon footprint, working towards making Somerset carbon neutral by 2030, and having a Somerset which is prepared for and resilient to the impacts of climate change. Decarbonising highway maintenance activity will play a key role in achieving these goals, and the Live Labs bid is included as a key action in the associated Climate Emergency action plan.
Somerset Highways and Transport Carbon Appraisal Report Sept 2022	Appraises Somerset's entire highways and transport capital programme and identifies priority areas to address (considering user emissions and embodied carbon) to achieve carbon reduction commitments. Identifies the highway maintenance programme as a key area of risk given the substantial embedded carbon (circa 10,000 tCO ₂ e) associated with the annual programme. Live Labs 2 will be a key mechanism to address this risk.
Cornwall Climate Change Action Plan 2019	Approved in July 2019 following declaration of a Climate Emergency and calling on Westminster to provide the powers and resources necessary to achieve the target for Cornwall to strive towards becoming carbon neutral by 2030. The plan notes that Cornwall Council will design and deliver low carbon investment and infrastructure.
Hampshire County Council Climate Change Strategy 2020-2025	Hampshire County Council set a target to be carbon neutral by 2050 and build resilience to the impacts of a two-degree celsius rise in temperature. The strategy notes that Hampshire County Council and its partners must demonstrate leadership and embed climate change mitigation and resilience into all key policy areas. The strategy identifies emissions from highways and construction materials as one of its strategic priorities to reduce transport sector emissions. The Live Labs programme will help deliver this strategic priority.
Somerset Highways Infrastructure Asset Management Strategy 2018	Includes 'reducing carbon emissions' as an objective for the Council's asset management framework. The strategy includes taking measures to reduce emissions as part of the approach to setting levels of service.
Cornwall Highway Maintenance Manual 2020	Includes Cornwall's highway maintenance plan which includes 'maximising environmental contribution' as part of the approach to setting levels of service considering safety, serviceability and sustainability.
Hampshire Highways Asset Management Strategy 2023	Includes an asset management objective to promote the use of more sustainable materials and implement processes that reduce the carbon footprint of the highway service.

2.3. Addressing Other Future Challenges






Using Doughnut Economics enables us to understand how future political and economic decision making can embrace the main determining factors of sustainability at national, local and sector level.

Simply targeting decarbonisation could have undesirable social consequences or unintended consequences of making other factors of sustainability worse for the environment. Considering decarbonisation as part of one element of Doughnut Economics will provide evidence of further sustainability and social factors which should also be measured, monitored and reported.

2.4. Partners & Roles

The Live Lab will bring together a team of local authorities, contractors and academic partners to deliver the project elements. All partners are committed to the project and have signed a project-specific Teaming Agreement. Our Net Zero Corridors will be managed by the local authorities, with works delivered through existing maintenance contracts by partner term contractors. The unique development of Doughnut Economics and the FHRG project element will be integrated and delivered by our committed academic and research partners. This collaboration will facilitate the sharing expertise and co-creation of innovative methods of decarbonisation. These private sector and academic partners, and their roles, are set out in the following table. For partners costed into the proposal the deliverables have also been summarised.

Table 2b	
	<p>Organisation: Circle Economy Name: Ilektra Kouloumpi Role: Circular Economy and Doughnut Economy Model Advisor</p>
<p>Role in programme & deliverables: Application of Doughnut Economics methodology and Circular Economy; development of toolkits for the use of Doughnut Economics at a corridor, geographic and sector level. Knowledge sharing and development of local teams. Activities will be delivered by their team, led by Ilektra Kouloumpi.</p>	
	<p>Organisation: Doughnut Economics Action Lab (DEAL) Name: Leonora Grcheva Role: Doughnut Economic Model Advisor</p>
<p>Role in programme: Member of the Learning Circle, providing advice and support.</p>	
	<p>Organisation: University of Exeter Name: Peter Lefort Role: Green Futures Network Advisor</p>
<p>Role in programme & deliverables: Will deploy Professor Xiaoyu Yan and recruit an additional Postdoctoral Researcher for their carbon budgeting and scenario planning activities. Supporting with carbon measurement/budgeting, analysis and implementing Doughnut Economics. Scenario planning for potential decarbonisation methods. Developing the Theory of Change to a Practice of Change. Facilitating knowledge sharing through their Green Futures Network.</p>	
	<p>Organisation: Colas Name: Sheila Jones Role: Strategic Project Support</p>
<p>Role in programme & deliverables: Project Management (of the Live Labs) and Programme Management (of the Consortium). Providing strategic support, managing risks and ensuring project delivery remains in line with the programme, budget and defined outcomes. Coordinating the involvement of all partners, ensuring relationships from the bid stage continue throughout delivery. Collaboration with term contractors to bring low and negative carbon delivery methods to the Net Zero Corridors.</p>	
	<p>Organisation: Milestone Name: Simon Watson Role: Maintenance Contractor</p>
<p>Role in programme & deliverables: Undertake works on the Corridors through the existing maintenance contracts with Somerset Council and Hampshire County Council. Take 'business as usual' maintenance and support the reduction of carbon emissions through changes to working methods, processes, materials, fuels and innovations.</p>	

	<p>Organisation: Cormac Name: Stuart Wright Role: Maintenance Contractor</p>
<p>Role in programme & deliverables: The current maintenance contractor for Cornwall Council. Undertake works on the Corridors through the existing arrangement with the Council. Take 'business as usual' maintenance and support the reduction of carbon emissions through changes to working methods, processes, materials, fuels and innovations.</p>	
	<p>Company: Wainwright Name: Andy Robinson Role: Technical Director</p>
<p>Role in programme: Sub-contractor to Milestone, supporting delivery of low carbon solutions within the Net Zero Corridors.</p>	
	<p>Organisation: OCL Regeneration Name: Stuart Gready Role: Recycling Specialist</p>
<p>Role in programme: Support circular solutions through Hampshire County Council's Micheldever recycling facility.</p>	
	<p>Organisation: Future Highways Research Group (FHRG) Name: Simon Wilson Role: Carbon Measurement</p>
<p>Role in programme & deliverables: Delivering research under the leadership of Simon Wilson, supported by Cranfield University. Providing access to the carbon calculator tool, creating an independently assessed baseline carbon footprint assessment, conducting annual assessments and certification. Incorporating Doughnut Economics within the modelling and analytical elements of the FHRG carbon tool. Facilitating knowledge sharing with the FHRG community</p>	
	<p>Organisation: Brightly Software Name: Hannah Winstanley Role: Data alignment</p>
<p>Role in programme: Data export and import, alignment of authorities' data with FHRG Carbon Analyser.</p>	

2.5. Funding Sources/Leverage

The three authority's current Highway Maintenance Capital and revenue budgets will be both utilised and leveraged throughout the trials with a combined budget of over £360m over the next three years. Details of funding are outlined below and detailed in the Financial Case.

Funding from existing capital/revenue budgets: We will use existing local authority budgets to deliver maintenance within the Net Zero Corridors, with the Live Labs funding used to provide the difference between the standard approach and the decarbonised approach. For example, if a maintenance activity normally cost £1,000 and a low carbon approach cost £1,200, we would fund the £200 extra-over cost through the Live Labs funding, with the remainder funded through existing budgets. Somerset County Council also has an additional £1m capital set aside for decarbonisation within the Net Zero Corridors.

Accessing external funding streams: We will link our Net Zero Corridors with external funding sources where possible. Examples include:

- **Academic grants/funding:** The University of Exeter has access to funding from the Engineering and Physical Sciences Research Council including the 'Impact Co-Creation Award', 'Knowledge Exchange Fellowship' and 'Impact Visionary Award'. Funding of up to £35,000 is available in each grant, which we would use to support knowledge transfer

activities. We will also explore the possibility of knowledge transfer partnerships to conduct research into Circular Economy solutions

- **S106 contributions:** We will use local developer contributions where available to support the delivery of improvements on the selected corridors
- **Future Government capital grants:** We will explore applications for funding from future Government capital grants over the three-year project duration
- **Green Infrastructure for Growth:** Funding from the EU's European Regional Development Fund enabled wildflower planting along one of our chosen corridors in Cornwall. Our corridor will build on this platform to fully decarbonise highway maintenance at the location
- The A38 corridor in Taunton is due to accommodate bus priority works via section 106 and DfT BSIP funds over the life of the Live Labs project as well as active travel investment; and therefore, provides an opportunity to consider decarbonisation across linked programmes on the corridor. Taunton was designated a "Garden Town" in 2017, and with two of our corridors in this town we will explore opportunities to link with garden town initiatives.

In-kind Contributions: The project has already benefited from significant pro-bono time from the three local authorities and contractor partners. This is expected to continue across many functions/activities once the project is established. It is expected that the in-kind contributions set out in section 5.2. will generate an equivalent value of around £500,000 throughout the project duration.

2.6. Drivers for Change

All three local authorities have declared Climate Emergencies and have identified highways maintenance as major source of each Council's own emissions. A major challenge in achieving our net zero goals is the decarbonisation of highways services, which form one of the largest parts of the local authorities' carbon footprints. We have set an objective to accelerate the local and sector highways decarbonisation beyond the natural trajectory (ultimately defined by Government targets and legislation). We also consider that efficiency will be key in reducing carbon emissions as we seek to create greater asset life for improved carbon cost savings.

This Live Lab will examine and address the following drivers for change and associated challenges on the journey to net zero highways:

- Highway maintenance will still be required as a statutory legal duty A key driver for change is the reality that although new highway construction could reduce, and in some cases, cease over time as part of wider societal and economic changes to address climate change, highway maintenance will still be required as a statutory legal duty of local authorities and as such, will have to be decarbonised to meet the Government's commitment to achieve net zero by 2050. Given this imperative, decarbonising highways needs to be affordable and become 'business as usual' as soon as possible
- Understanding barriers to net zero highways where future activity is required – the sector needs to identify which aspects of highway service delivery can be decarbonised using existing knowledge, and which will require new innovations. This includes both different asset types (such as carriageway or drainage) and the different stages of an asset's lifecycle
- Effective decision making that balances decarbonisation against other needs – there is no existing systems approach to balance environmental, social and economic needs of highways. For example, the impact decarbonisation has on the reliability, safety and performance of highway networks. The risks of decarbonisation must be understood before net zero can be successfully rolled out by a local authority
- Cross-sector collaboration – decarbonisation is a sector-wide problem, however opportunities to share learning are frequently missed. Local authorities, contractors and academia must work in partnership to pool expertise, share lessons learned (both positive

and negative) and jointly implement a new way of working that has net zero carbon at the core

- As the majority of emissions from highway maintenance are within scopes 2 and 3, this naturally led to involving and engaging with contracted supply chain and local as well as regional materials suppliers, all of whom are pursuing this agenda from their own perspective as part of their corporate social responsibility and governance. The learning gained from this Live Lab will be immensely valuable at a sector level and will move the highways industry forward significantly in its working methods, treatments and materials to deliver Net Zero Corridors and tackle the Climate Emergency
- Measuring and Evaluation (M&E) of carbon impacts – the measurement of carbon is a complex issue, with a range of tools available. With the potential introduction of carbon budgeting, a robust approach to measurement is required
- Ways of working - highways operations such as travel to site create a significant proportion of the carbon emissions, and new materials are only a part of the solution. Trial corridors give us the opportunity to reduce emissions through developing entirely new operational ways of working
- Behavioural and attitudinal change - we identified a need for substantial engagement with local communities to create both understanding and subsequently behavioural and attitudinal changes necessary to deliver reductions in carbon emissions. This ranges from a better understanding of how and why emissions are created in current highway maintenance operations and the role that communities can play in reducing them. This includes specific scheme involvement where the local community are mobilised to support the trials.

2.7. Process and Locational Maps

Our proposed corridors are identified in Fig. 2a. The selection process involved collaborative workshoping with the authorities and partners to identify the broad range of characteristics required to maximise learning opportunities. This resulted in the development of a set of criteria used by each authority to identify sections of the network as demonstrators.

The criteria looked at physical features, types of maintenance required, elements unique to the area and social factors. For example, the application of the criteria led to the selection of a corridor in each authority area that is identified by the National Infrastructure Commission as being most in need nationally of additional investment in connectivity, ensuring places most in need are levelled up and not left behind economically. The chosen corridors link each of Hythe, Wells, and St Austell to the Strategic Road Network and are important for connectivity to those places. The corridor locations will be reviewed and validated during mobilisation.

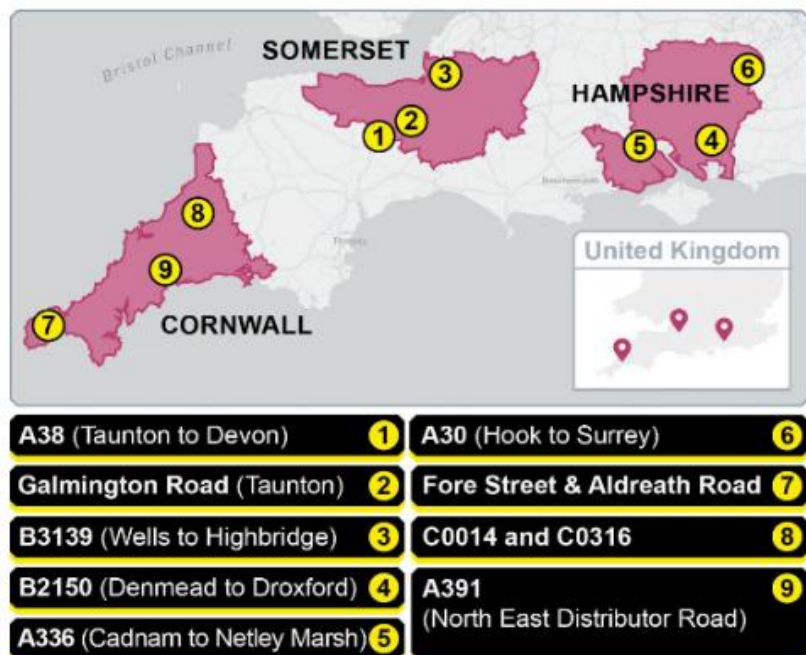


Figure 2a: Proposed corridors and their locations

2.8. Theory of Change and Logic Map

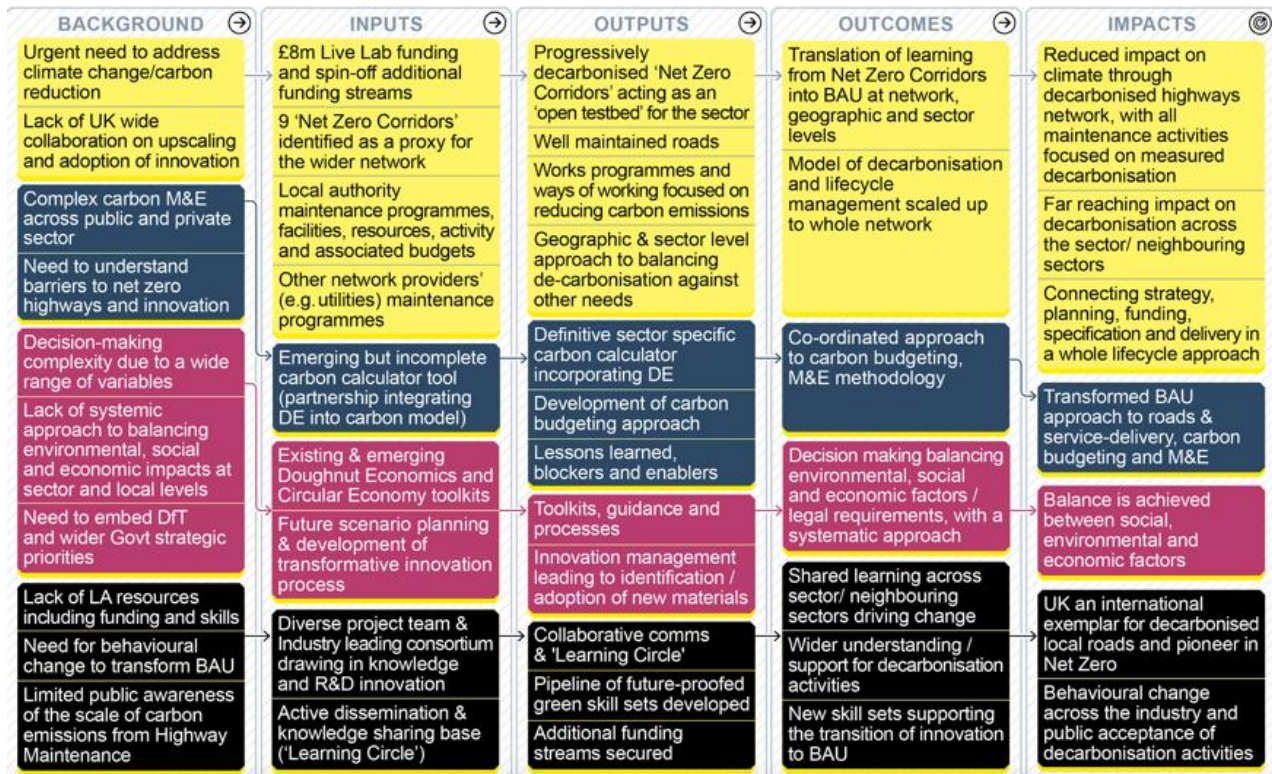


Figure 2b: Golden threads in the ToC

The Theory of Change (ToC) for the Live Lab sets out the background, inputs, outputs, outcomes and impacts, and establishes the pre-conditions necessary to achieve the identified long-term goals. 'Golden threads' of the anticipated process of change were identified and mapped using the ToC, as indicated in Fig. 2b by the highlighted pathways. The ToC submitted with the proposal has been reviewed for the final submission of the Business Case. Further alignment with the drivers for change and challenges has been undertaken and set out in Table 2c below. This review has supported the development of the Economic Case by firstly demonstrating that the programme supports delivery of the objectives – a gateway for demonstrating value for money – and secondly by demonstrating the key benefit streams associated with the programme.

Going forward the ToC will be monitored, reviewed and updated to become a 'Practice of Change' embedded at the core of our management of the project, and this work will be supported by Exeter University. This will inform both our M&E framework and the work of ADEPT's wider M&E.

Table 2c	
Key Drivers for Change & Challenges	Mapped as a Golden Thread in the ToC
Highway maintenance will still be required as a statutory legal duty	Yellow thread
Understanding barriers to net zero highways where future activity is required	Navy thread
Effective decision making that balances decarbonisation against other needs	Red thread
Cross-sector collaboration	Black thread
Measuring and Evaluation (M&E) of carbon impacts	Navy thread
Ways of working	Yellow thread
Behavioural and attitudinal change	Black thread

2.9. Measuring Impacts and Links with M&E Activities

The proposed monitoring and evaluation framework is described in detail in the sections on Carbon and M&E and has been derived from the process we set out in our initial proposal for running the trials.

We will use FHRG's carbon calculator to set a Year 1 carbon baseline for each corridor in the trials and sequentially address (from the largest to smallest) each element of carbon emissions in the reported baseline. Each emission element will be broken down in terms of its cause, need and presence to consider in a consistent hierarchy outlining how the emission can be eliminated, reduced or mitigated.

The impacts of change will be measured directly in most cases during the live trials and reported annually as an overall summary. For example, the Year 1 outcome will then become the Year 2 baseline. It is envisaged that the Year 1 outcome will be greater than the Year 2 baseline as further reductions will be identified in the trial analysis.

2.10. Measuring Impacts Beyond Carbon

We recognise the need to evaluate the wider impacts of the work beyond carbon and identify both the intended and unintended consequences. Underpinning our approach is the Doughnut Economics Model, a framework that balances consideration of environmental, social and economic factors. Past and current work addressing these factors will be examined to build a 'portrait of place'. Measuring and monitoring these factors will enable metrics to be applied, KPIs to be established and an innovative and experimental dashboard will be developed.

The wider impacts of the work will also be measured through the following:

- **Asset data:** We will measure the impact decarbonisation has on the highway asset performance, particularly where we have used an innovative material or new maintenance approach. We will review the BAU condition monitoring processes already put in place by the authorities and may amend these to reduce the carbon emissions associated with the survey processes, or to collect bespoke data related to the long-term performance of particular treatments
- **Public satisfaction:** The public perception of our corridors will be assessed through the M&E of complaints/compliments and surveys, supported by the Doughnut Economics dashboard and will highlight any potential social issues linked to the decarbonisation work.
- **Cost:** To enable our project to be replicated and scaled up, we will collect data on the financial impact of decarbonisation
- **Operational data:** We will collect details of the required change to operational delivery, including time on site, type of traffic management required, whether works can be delivered at day or night, and the level of resources needed
- **Culture change:** Baseline surveys will be carried out at the start of the project, followed by annual monitoring and evaluation surveys, of our project teams (both local authority and term contractor) to assess changes in behaviour, particularly whether carbon is more prominent in decision making.

Further details on our approach to measuring impacts is set out in the chapter on M&E.

3. The Economic Case

The HM Treasury Green Book sets out the approach to be used to guide the spending of public money. Given the nature of the Live Labs programme and funding sources, and the ADEPT guidance, the Economic Case has been undertaken under the umbrella of this guidance and the Department for Transport (DfT) Value for Money Framework. However, it is recognised that this is not a traditional transport scheme, and the Economic Case therefore acknowledges the wider objectives of the innovative pilot programme including the learning and evidence gained that can be used elsewhere nationally and internationally.

At this stage there are not specific schemes identified for each of the nine corridors within the Wessex programme, therefore it is not possible to undertake a detailed economic appraisal and provide a Benefit Cost Ratio or detailed value for money assessment. To attempt this to any level of detail at this stage requires a significant number of assumptions. Therefore, whilst a high-level assessment of potential carbon reduction has been made, the value for money has been considered using the DfT Value for Money Framework formed of three elements: option development, consideration of costs & benefits, consideration of risks & uncertainties.

This Economic Case demonstrates that the Wessex programme will deliver value for money under each of these elements. Our initial high-level assessment using an illustrative corridor confirms that the DfT investment will deliver high value for money once the decarbonisation toolkit developed through the programme is rolled out across the Somerset, Cornwall and Hampshire networks. Value for money will be captured in detail as part of the monitoring and evaluation, both during the trial (feeding into the Carbon Toolkit) and in the period after the trial to understand the longer-term impacts. Although a detailed appraisal is not possible at this stage, a range of case studies have been used to demonstrate the potential scale of impact of different types of interventions.

3.1. Option Development

The 2022 update to the HM Treasury Green Book reinforced that a scheme cannot demonstrate value for money if it does not deliver against objectives at a local, regional or national level. The programme objectives and their alignment to the Live Labs vision and principles and local, regional and national policies is shown in Table 2a of the Strategic Case. Figure 2b within the Strategic Case shows the Theory of Change (ToC) for the Wessex programme, providing an indication of the main benefit streams attributable to the pilot. The ToC also demonstrates that the outputs of the pilot will address the drivers for change (Table 2c of the Strategic Case) and support the delivery of the objectives. The ToC will be considered throughout option development ensuring short, medium and long-term outputs of an intervention are in line with the overarching ambitions.

Options will be developed for each of the nine corridors and assessed using a staged approach. The corridors, all different in nature, provide a thorough representation of the highway network across the three counties. The option development will explore the different interventions appropriate to these varied contexts. The use of the Doughnut Economics Model as part of option development and assessment ensures understanding and management of the positive and negative impacts from a range of perspectives and demonstrates potential trade-offs. This aligns with the Green Book process of considering societal impacts across a multi-criteria spectrum.

Case Study: Doughnut Economics Action Lab (DEAL) as part of Amsterdam Circular Strategy 2020 – 2025 ¹ *The Doughnut of social and planetary boundaries envisions a world in which people and the planet are in balance. Between the ecological ceiling and the social foundation lies a doughnut shaped space in which humanity can thrive. This involves the balancing of the needs of people with the means of the living planet. As part of the development of the Amsterdam Circular Strategy, the City of Amsterdam used the Doughnut Economics Model to balance how ‘societies and businesses can contribute to economic development whilst still*

¹ Amsterdam Circular Strategy, City of Amsterdam, 2020-2025

respecting the limits of the planet and our society'. Amsterdam's vision is to become one of the world's most circular cities: innovative, prosperous, inclusive and attractive.

3.2. Consideration of Costs and Benefits

The Economic Case sets out the theoretical magnitude of carbon and costs savings that may be achieved through the Live Lab. Due to the research-based nature of the Live Lab, any figures calculated at this stage, prior to the start of the project are estimates based on broad assumptions and an illustrative hypothetical 10km 'Test Corridor'. There are also many unknown variables, such as the innovations that will be selected as interventions. Any figures are predicated on additional work on the assumptions, variables, emissions factor (EF) and the cost of carbon which will be undertaken once the project begins. Valuable knowledge will be gained when comparing this early approach to the full detailed carbon analysis planned to take place during the project.

This initial exploration of savings has used a method of estimating the potential magnitude of savings using an EF of kgCo2e/pound spent, from the UK Carbon Footprint (2019, most recent) for civil engineering of 0.306 kgCO2e/£ spent. The main steps were:

- Establishing the list of typical highways maintenance activities on the network (using Somerset network)
- Identifying the anticipated total annual budgets for those activities (Somerset budgets)
- Estimating the typical level of each activity for a Test Corridor (applying weightings, given that the frequency of activity undertaken on a specific Corridor may not reflect the activities undertaken on the network as a whole)
- Calculating the potential carbon emissions arising from the activity, by applying the EF
- Estimating potential reductions in emissions arising from changes in activities (interventions).

The cost and carbon impact of potential interventions was estimated for the following:

- Changes in scope & scale of activities (e.g. doing less)
- Changes in frequency of activities (e.g. doing less frequently & changing ways of working)
- Experimental processes (Live Labs projects)
- Experimental materials and fuels (Live Labs projects).

The assumed carbon reductions from changes in activities ranged from relatively small reductions for some activities to around 60% reduction for others. When combined on a corridor it was concluded that changes could potentially deliver an overall **31.2%** reduction as a broad initial estimate. It might be that more radical intervention can deliver greater change, but for the purpose of this initial business case it was concluded that this figure is realistically deliverable. The magnitude of potential savings scaled up to the Somerset and Wessex networks and UK local roads network is set out in the following table (Table 3a). This indicates that the carbon baseline for the Somerset network using this methodology compares well with the baseline calculated by the current TMC contractor; and scaling up application of a decarbonisation toolkit from a corridor to the whole network is likely to achieve substantial annual reductions in carbon emissions.

Table 3a Illustrative Annual Carbon/Costs Savings				
	Illustrative Corridor	Somerset Network	Wessex Network	National Network
Length(km)	10	6,745	22,800	386,404
Carbon baseline (Kg)	16,992	11,461,303	38,742,433	656,589,077
Carbon reduction (Kg)	5,302	3,575,927	12,087,639	204,855,793
Annual value (£) of carbon reduction	£1,336	£901,133	£3,046,085	£51,623,660

* *Government carbon value (£/tCO2e, 2020 prices) for 2023 (central series) [£252], from Policy Paper 'Valuation of greenhouse gas emissions: for policy appraisal and evaluation', Sept '21*

This illustrates that an initial £5m government investment in the Wessex live labs programme would deliver of the order of a £3m economic benefit per annum just through the value of carbon saved, once the toolkit developed by the programme is fully applied to just the Cornwall, Hampshire and Somerset networks. Assuming it would take around ten years to have applied the new toolkit to the whole network it can be assumed that high value for money will have been achieved well in advance of the usual 60-year appraisal periods for Government.

Changes in financial costs have been considered based on the assumption that changes in materials/activities will be cost-neutral over time due to decreasing costs once interventions become mainstream. Only those likely to be cost-neutral or better over time will be selected for the toolkit. Some changes will lead to long-term cost efficiency in terms of 'doing less' or 'doing less frequently'. The Carbon Case and M&E section set out further detail of the methodology for monitoring the carbon impacts of the pilot.

The following sections discuss the wider potential benefits and costs of the pilot. The scale of impact under each of the benefit and cost streams will be dependent on the actual measure implemented and the context of the corridor. The specific measures that will be implemented on each corridor have not yet been identified and therefore assessing their impacts in detail is not feasible. Case studies are attributed to benefit or cost streams but would clearly deliver impacts over a broad range of themes which would all support the scheme's value for money.

3.3. Benefits

The pilot will provide a testbed for innovation, trialling novel and ambitious approaches to decarbonising highway maintenance. The fundamental benefit associated with the pilot is therefore the lessons learned and the application of these elsewhere to support the decarbonisation agenda and provide an invaluable evidence base to both local authorities and industry, enabling decarbonised highway maintenance to become business as usual. The pilot has the potential to be a driver of significant behavioural change within industry.

Examples of how this can be successful include a number of trials between 2016-2020 undertaken by FM Conway using Reclaimed Asphalt on the A1, A40, M25 and M3². Learning from each trial was taken onboard into the following workstreams, exemplifying how their innovation and the lessons learned is facilitating a change in 'business as usual'³.

The pilot will show how different decarbonisation approaches can deliver against the sub-impacts from the Value for Money Framework, grouped under the themes of economic, environmental and social. It will also demonstrate any potential trade-offs that are required between these impacts to achieve the overarching objectives. Although reducing carbon emissions is central to the pilot, there are a range of other impacts which will be considered when assessing the overall value for money, including those described below supported by a range of case studies aligned with the potential measures that the Wessex programme could implement.

3.4. Journey Times

Interventions could result in journey time savings and improvements to reliability due to innovative highway maintenance solutions reducing the disruption caused during works and the frequency of works; and reductions in the travel requirements of maintenance teams allowing this time to be used more productively.

As part of the Westminster Resurfacing Scheme in 2021, a single layer solution, SureLayer® E, meant the carriageway could be resurfaced in one pass. This reduced the time spent on site, allowing the highway to be reopened sooner, reducing the impact on the community. Being laid in a single layer increased productivity and reduced the number of HGV movements by 55%⁴.

3.5. Economic Impacts

² M25 50% Recycled Asphalt Pavement, FM Conway, 2017

³ FM Conway and TfL set "benchmark" for RAP use in A40 project, World Highways, 2017

⁴ Collaboration on resurfacing scheme to boost carbon savings, Asphalt Industry Alliance, 2021

There would also be economic benefits associated with targeting local supply chains. As part of sourcing materials locally for the National Highways A30 upgrade in Cornwall, £4 million was invested in the nearby Quarry to produce carbon-friendly warm mix asphalt for the road surfacing. Sourcing materials locally led to an estimated **60% reduction in carbon emissions per tonne of locally imported aggregate**⁵. This scheme also facilitated **successful collaboration with local industries and skills**, aligning to the Live Labs overarching objectives. Similarly, the Hampshire Highways Programme undertaken in 2021 estimates that through the use of locally sourced plastic kerbing this could **reduce carbon emissions by 40%**.

3.6. Biodiversity / Landscape

Interventions which include planting and rewilding will have a beneficial impact on biodiversity and the landscape. The A14 Cambridge to Huntingdon improvement scheme was developed to provide additional capacity to overcome congestion, improve safety and unlock growth. The scheme was undertaken between 2016-2020 and was designed to reduce the impacts on the surrounding landscape and wildlife. Mitigations included the creation of over a square mile of new habitat for wildlife, the replacement of trees at a ratio of two to one and the incorporation of wildlife tunnels. It was predicated that the scheme will result in a net increase in biodiversity units of 11.5%⁶.

3.7. Costs

The Financial Case provides details of the upfront capital expenditure of undertaking the pilot, and the funding sources which will be leveraged from both the public and private sector. There is potential for the interventions to impact on the ongoing operation, maintenance and renewal costs of the highway network for the councils. This could be due to:

- Implementation of alternative materials may result in less frequent requirements for maintenance
- Less time taken to undertake maintenance
- Alternative materials may be cheaper to maintain when compared to current arrangements
- Changes in the requirement for maintenance teams to travel to / from sites could impact on the fuel and vehicle maintenance costs
- Interventions which promote recycling of materials as opposed to purchasing new materials.

Case Studies:

The use of CarbonLock as part of National Highways' current trial on the A30 in Devon is expected to enhance the durability of the infrastructure and extend the life of the asphalt, increasing the lifetime of the asset and reducing the need for maintenance. The road is scheduled to be open to traffic at the end of 2023⁷.

The Oxfordshire County Council's Road and Gully Waste Recycling programme demonstrates a circular economy where waste products are utilised rather than disposed of. These recycled materials are then used in road repair and gully cleaning projects. Over a 4-year period, following a trial in 2021, it is anticipated that the scheme could stop 1,000 tonnes of CO2 being emitted and £4.3m of cost savings⁸.

3.8. Consideration of Risks and Uncertainties to Value for Money

Driven by its nature as a pilot, the greatest risk to value for money is the uncertainty of impacts due to the novel interventions being considered. The case studies set out in the section above demonstrate that these types of interventions have delivered benefits and cost savings elsewhere,

⁵ Cornish home produce is core to National Highways' greener A30 road upgrade, National Highways, 2022

⁶ A14 Cambridge to Huntingdon- Environment, National Highways, 2020

⁷ Carbon dioxide absorbing asphalt trialled on A30, New Civil Engineer, 2023

⁸ Recycling waste for road repairs saves cash and carbon, Oxfordshire County Council. 2021

however many of these interventions are not mature in their development and so there is limited testing and evidence to give full confidence in their outputs. Linked to this, there is also a risk of unintended consequences as a result of the implementation of innovative interventions that are at an early stage of development.

The Management Case sets out the risks beyond value for money of the programme, and the mitigation measures which will be put in place to manage and overcome these. This process will ensure the risk and uncertainty do not impact on the value delivered by the scheme.

3.9. Value for Money Statement

The approach to the programme will ensure value for money is delivered throughout the lifecycle of the programme from option development through to implementation and consideration and mitigation of the associated risks throughout the process.

An initial assessment using an illustrative corridor demonstrates that high value for money will certainly be gained for a Government investment of around £5m once the toolkits developed through the programme are implemented across the promoting authorities highway networks, and that wider UK application will dramatically increase the value for money of the initial investment.

The option development methodology will support the delivery of the objectives of the Live Labs Programme and also policy at a local, regional and national level, such as levelling up, environmental regulation and social needs. The HMT Green Book highlights this as a gateway criterion for a scheme to deliver value for money. The use of the Doughnut Economics model enables consideration of the broad range of intervention impacts from different perspectives, in particular environmental and social.

The benefits and costs of the Wessex Programme cannot be quantified in detail at this stage in the programme lifecycle, until the specific interventions are identified through the programme itself; and therefore an accurate evaluation of value for money cannot be assessed yet through a comparison of the monetised impacts. The core benefits that are directly attributable to the programme are considered to be decarbonising highway maintenance on the Wessex corridors and the evidence base gained through monitoring and evaluation which will allow these practices to be validated and implemented elsewhere. The insight gained through the programme will be instrumental in driving behaviour change in industry, both nationally and internationally.

Whilst the primary focus of the pilot is supporting the decarbonisation agenda, the benefits that interventions could deliver stretch far beyond this. Schemes will also improve air quality and biodiversity. There could be benefits to road users through reduced disruption during maintenance, improving journey times and reliability. This would deliver productivity benefits both for those travelling but also for maintenance teams where there are efficiencies in delivery times of maintenance regimes.

There are upfront costs associated with delivering the pilot, however the interventions delivered may also positively impact on the ongoing operation, maintenance and renewal costs incurred by the councils. Extending the lifecycle of assets would reduce the regularity with which renewals are required, and utilising recycled and locally sourced materials may also provide cost and environmental efficiencies. Changes to the way that council maintenance teams operate may impact on the costs of this. The programme will seek to leverage funding from the public and private sector.

The key risks related to value for money are the uncertainty of impacts given the specific schemes have not yet been identified for each of the corridors, and interventions are not necessarily widely tested in industry. These risks will be managed in line with the risk management strategy for the programme to reduce the potential impact on value for money.

Overall, the programme will directly support policy priorities and deliver a range of benefits beyond solely decarbonisation, in particular lessons learned to be applied elsewhere and encouraging industry behaviour change. This implies it will deliver value for money.

4. The Commercial Case

4.1. Projected Procurement and Intellectual Activities

The Wessex Live Labs programme will be delivered by Cornwall Council, Hampshire County Council and Somerset Council working collaboratively. The parties and other key partners have an initial 'Teaming Agreement' in place to cover bid submission and approval, and this will be updated and developed to cover the lifetime of the programme.

The partners, their roles and deliverables are detailed in Table 2b in the Strategic Case, and the split of activities across these partners is summarised below.

Construction: Delivery of works within the demonstrator corridors

Works will be undertaken through existing term maintenance and construction contracts available to the partner local authorities, or replacement contracts for which procurement processes are underway. The Live Labs grant will be combined with the local authorities' 'business as usual' funding for corridor programmes.

Programme Management: Programme Management, Governance, Carbon Support, Communications and Learning Circle

Local Authority Resources: The three local authorities will each directly employ a Project Enabler for local coordination of the delivery programmes. Shared legal and communications budgets will be utilised through existing legal and comms advisors and external PR support may be utilised if necessary, through existing contracts with the Councils.

Project Director, Project Management and Carbon support for the Wessex programme: Undertaken by Colas who will also employ a carbon support resource and undertake programme management and governance support for the wider Consortium (resource for this is included in the cost for the Liverpool programme).

Design: Carbon Baselineing, Assessment, Review and Certification

This will be undertaken by the programme team with tools and support provided by Proving Services and the FHRG. Alignment of existing data sets with FHRG's Carbon Analyser will be supported by Brightly.

Design: Decision-Making (Doughnut Economics and Circular Solutions)

Undertaken by Circle Economy with the support of the Doughnut Economics Action Lab (DEAL). Circle Economy is a non-profit impact organisation, operating as a foundation (founded in 2011), DEAL is a Community Interest Company, a private company limited by guarantee without share capital,

Design: Carbon Budgeting and Scenario Planning:

Will be undertaken by University of Exeter, who will provide the academic rigour needed to develop the concepts of carbon budgeting and apply them to the design of highways programmes. Intended Procurement Routes for the Project's Key Outputs and Activities

4.2. Summary of proposed procurement routes for programme activities are outlined below.

Table 4a			
Activity	Funding Recipient	Procurement Route	Grant Allocation
Construction			
Somerset Demonstrator Corridor works	SC	23/24: Existing Term Maintenance Contract Milestone Infrastructure.	£1,021,000

		24/25 & 25/26: New Highways Contracts currently being procured to be in place for 1 April 2024.	
Hampshire Demonstrator Corridor works	HCC	Existing Term Maintenance Contract Milestone Infrastructure.	£1,021,000
Cornwall Demonstrator Corridor works	CC	Existing Term Maintenance Contract Cormac Solutions Ltd.	£1,021,000
Programme Management			
Local Authority Resources	SC	Project enabler: Direct employment Comms: Existing staff or contracts Legal: Existing legal advisors	£180,000 £10,000 £25,000
	HCC	Project enabler: Direct employment Comms: Existing staff or contracts	£180,000 £10,000
	CC	Project enabler: Direct employment Comms: Existing staff or contracts	£180,000 £10,000
Programme Management	SC	Direct Award to Colas through Crown Commercial Construction "Works and Associated Services Framework."	£335,000
Carbon support	SC		£90,000
Design			
Carbon Assessment & Certification	SC	Direct Award to Proving Services as a unique supplier requiring a waiver and potential use of VEAT notice to alert the Market to this decision.	£186,000
Doughnut Economics and Circular Solutions	SC	Direct Award to Colas through Crown Commercial Construction "Works and Associated Services Framework". Circle Economy are a Sub-Contractor to Colas.	£439,000
	SC	Direct Award to Proving Services as a unique supplier requiring a waiver and potential use of VEAT notice to alert the Market to this decision.	£50,000
Carbon Budgeting and Scenario Planning	SC	Direct Award to Colas through Crown Commercial Construction Works and Associated Services Framework. University of Exeter are a Sub-Contractor to Colas.	£362,000
TOTAL			£5,120,000

4.3. Complying with Procurement, Subsidy Control and State Aid Regimes

Procurement:

Table 4b		
Activity	Supplier	Compliance with procurement regulations
Construction	Existing TMCs	Already procured in accordance with procurement regulations.
	New highways contracts	Currently being procured by Somerset Council following a compliant competitive with negotiation procedure.
Programme Management & Carbon Support	Colas	Somerset Council proposes to award the work on behalf of partners through Crown Commercial which is a national framework which has been competitively procured and has terms which allow direct award to contractors and their sub-contractors who are available through the framework for values up to £3m.
Design	Colas subcontracted	

	to Circle Economy	Construction Works and Associated Services - CCS crowncommercial.gov.uk
	Colas subcontracted to University of Exeter	Colas is on Lot 1.2.2: Civil Engineering Works & Minor Associated Building Works & Services – South England.
	Proving Services	Somerset Council proposes to direct award to Proving Services which will require a waiver to the Council's standing orders but is permissible under Public Contracts Regulations 2015 Regulation 32. 2(b) 'Use of the negotiated procedure without prior publication' on the grounds that these services can be supplied only by a particular economic operator. Any risk of challenge to this decision will be managed, if necessary, through issuing a Voluntary Ex-Ante Transparency (VEAT) Notice used when a contracting authority has awarded a contract to a supplier without first having published a tender notice with the justification that the contracting authority has concluded there is only one suitable supplier who can cater to their requirement.

4.4. Subsidy Control and State Aid

We confirm that we have obtained internal legal advice on Somerset Council's obligations under the Subsidy Control Act (which can be provided on request) and the implications of the proposal as set out in the commercial case. A preliminary assessment has been undertaken with a summary covering each element of the programme set out below.

Construction: The receipt of the grant by Somerset Council (and the other participating local Government authorities) is unlikely to constitute a subsidy as Somerset Council is not, for the purposes of the funding, an enterprise undertaking an economic activity.

The receipt of grant funding by the highway maintenance contractors may constitute a subsidy. However, this will require further investigation once the details of how the funding will be utilised are known. While it is expected that the grant funding will pass through the highway maintenance contractors, it is expected that they engage third party carbon-neutral suppliers at market rates. If this is the case, the question of whether or not indirect financial assistance has been given is likely to hinge on the question of whether there has been a competitive procurement process undertaken and, if so, how wide the conditions of participation.

Programme Management: The funding of internal positions by Somerset Council (and the other participating local Government authorities) is unlikely to constitute a subsidy as Somerset Council is not, for the purposes of the funding, an enterprise undertaking an economic activity.

The engagement of Colas through Crown Commercial Construction Works and Associated Services Framework Agreement is also unlikely to constitute a subsidy as the Framework Agreement (and the applicable supplier pricing) was established through an open market procurement process. As such, the engagement of Colas is unlikely to confer an economic advantage.

Design: The intention is to provide grant funding to Proving Services through direct award, and Circle Economy acting as a sub-contractor of Colas. It is not considered that financial assistance to these organisations constitutes a subsidy since the unique services they are both providing (development of the doughnut economics model, and the Future Highways Research Group activity as explored in 4.5 below) are operating in a market without competition.

The grant funding provided to the University of Exeter is unlikely to constitute a subsidy as it is a non-economic enterprise that is not acting commercially.

Other Subsidy Considerations: The potential for the grant funding being used for a purpose that constitutes a subsidy pursuant to the World Trade Organisation Agreement on Subsidies and Countervailing Measures and under the UK's various Free Trade Agreements (including the UK-

EU trade and co-operation agreement) was also considered but deemed as not meeting the necessary criteria.

4.5. Available Sourcing Options and Preferred Option Rationale

Construction: The key purpose of the Wessex programme is to explore delivery of low-carbon solutions through existing delivery mechanisms, so no alternative sourcing options for delivery of the construction/ demonstrator corridor works is necessary.

Programme Management & Carbon Support: Colas developed the overall concept for the Wessex programme, coordinated the bid preparation and detailed proposals, and leveraged their relationships with the key (unique) knowledge partners to create the proposition that has now been agreed in principle. They also have access to a substantial R&D knowledge base within their organisation. Colas has not charged for the work undertaken prior to this business case. Colas are therefore a key innovation partner and central to the success of this programme and ensuring it offers best value for money through using embedded knowledge for efficient and effective roll-out.

We have explored various sourcing options for these services including the following:

- Bespoke open or restricted tender process: This was discounted due to the need to secure the embedded knowledge and the unique relationships provided by Colas as a key innovation partner in the development of the programme
- Existing contract with Liverpool City Council: This was considered as Liverpool are part of the Corridor and Place Based Consortium but was discounted due to uncertainty about the contract terms enabling this appointment
- Frameworks: Various frameworks were considered including ESPO, Pagabo Civils and Infrastructure Framework and Crown Commercial Construction Works and Associated Services Framework.

Preferred Option: Having considered the available frameworks, the Crown Commercial Framework was considered to offer an appropriate and compliant route to market, enabling direct award for values up to £3m which matches the needs of the programme.

Design – Doughnut Economics, Carbon Budgeting and Scenario Planning: Circle Economy and DEAL are a unique supplier of the relevant services in relation to Doughnut Economics, having developed and retained ownership of the intellectual property related to the model. An option to undertake a negotiated procedure without prior publication was considered but on balance it was concluded that sub-contracting to Colas is the most simple and efficient mechanism to contract for these services.

Exeter University has been a key partner in delivering the programme to meet DfT and ADEPT's explicit requirement for active private sector and academic collaboration. On balance it was concluded that sub-contracting to Colas is the most simple and efficient mechanism to contract for these services.

Design – Carbon Assessment and Certification: Proving Services has developed what is becoming the industry standard carbon analyser tool and associated highways industry carbon profiles and facilitate the FHRG so are uniquely placed to undertake this role in the programme. The option to undertake a negotiated procedure without prior publication is considered the most appropriate mechanism to secure these services.

Contracting Arrangements between the Local Authorities and the Suppliers: A procurement approach whereby each of Somerset, Hampshire and Cornwall contracted separately with the knowledge partners was discussed and discounted on the basis that it required procurement strategies to be agreed within each council and back-to-back agreements to be developed and agreed. On balance it was considered to be much simpler and more efficient for Somerset to contract with the non-construction partners on behalf of the programme.

4.6. Our Procurement Plan and Timescales

The thumbnail below in Figure 4a shows our proposed Procurement Plan.

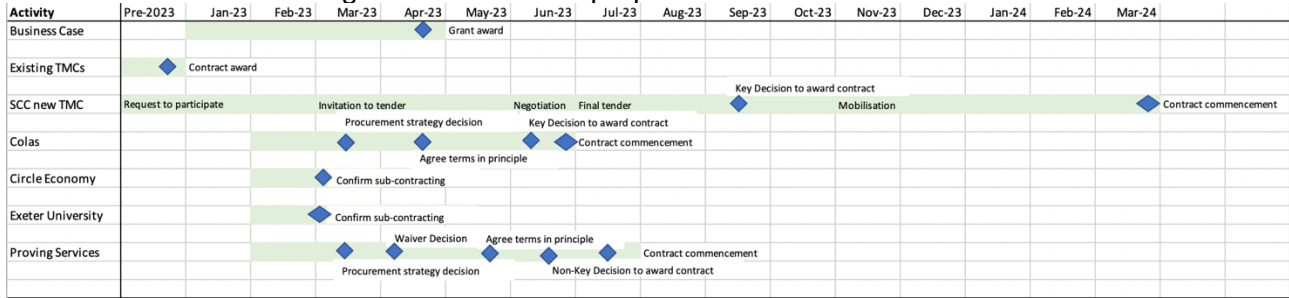


Figure 4a: Thumbnail of the attached Procurement Plan

4.7. Early Consultation with the Supply Side

The delivery partners have been closely involved in discussion regarding delivery of the programme since the summer of 2022 and have met regularly throughout the development of the bid and the business case. A partnering agreement and MOU were signed during the bid process and will be reviewed and updated prior to commencing programme delivery. The MOU was submitted to ADEPT with the Addendum in November 2023.

4.8. Outline Output/Outcome Based Specification

Demonstrator Works: These will be ordered through task orders under existing TMC arrangements and will be specified on a case-by-case basis as a result of the carbon assessment identifying the need for a specification to change, and identification of an appropriate low-carbon solution via innovation partners. Payment will be under the individual contract terms.

Programme management and design activities: The outputs under these contracts will be delivered for fixed sums in line with the proposals submitted by the suppliers which informed the costed bid proposal. The deliverables of each partner is detailed in Table 2b in the Strategic Case.

4.9. Section 151 / 73 Officer Sign Off

Table 4c	
Section 151 Officer Declaration	
As Section 151 Officer for the Council, I declare that the financial information in this business case is accurate to the best of my knowledge and that the Council has allocated sufficient budget to deliver the programme on the basis of its proposed funding contribution.	
Somerset Council Name: Jason Vaughan	Approved on: 20 April 2023
Hampshire County Council Name: Rob Carr	Approved on: 18 April 2023
Cornwall Council Name: Tracie Langley	Approved on: 4 May 2023

5. The Financial Case

5.1. The Funding Profile

The funding profile is based on a 37:33:30 split over the three years of the Live Lab project, as set out in Table 5a and detailed further in the Project Plan incorporated within the Management Case. The profile reflects the change to the start date of the overall Live Lab programme. Previously mobilisation was scheduled for Jan – Mar '23, prior to the project starting. The likely project start date is now May/June '23 and therefore mobilisation will now take place in Year 1 of the 3-year timeline.

- **Year 1** - will focus on mobilising and establishing a solid foundation of understanding, collaboration and research. This will include establishing the governance, carbon baselining, refining the programme of M&E and facilitate the forward planning of work on the Corridors. This first year will also focus on the development of the Doughnut Economics Model and the launch of research on carbon budgeting. Work developing the initial Corridors will provide a launchpad for Year 2
- **Years 2 & 3** - will build on the foundation established in Year 1, and work on further Corridors will begin. This work is planned as a phased approach to allow for iterative learning and knowledge gained from early work will inform the approach for later Corridors. Work on other research-led activities will continue.
- **Legacy tail** – the Live Lab project will close, and the follow-up legacy activity over a five-year tail will be undertaken by ADEPT, and therefore has not been detailed in the Business Case.

Work package	Budget	Year 1	Year 2	Year 3	Profiling
Project Management	£875,000	£320,000	£277,500	£277,500	Project management including 'umbrella' programme management of the Consortium. Initial focus on set-up reflected in profile. Note: additional shared funding element with Liverpool Live Lab
Legal & contractual	£25,000	£19,000	£3,000	£3,000	Higher costs profiled for Year 1 due to mobilisation
Comms	£30,000	£14,000	£8,000	£8,000	Funding for part-time comms input supported by existing comms roles in each authority. Local comms will be 'content creation', and ADEPT will cover majority of the comms activity.
Carbon M&E	390,000	£40,000	£25,000	£25,000	Funding for carbon role shared by Consortium, evenly split to reflect FTE employment. Note: additional shared funding element with Liverpool Live Lab
Carbon budgeting &	£362,000	£230,000	£102,000	£30,000	Profiling reflects academic research roles

scenario planning					commissioned across the 3 years, with additional initial work to establish research in Year 1
FHRG Support Package	£186,000	£96,000	£50,000	£40,000	Profiled to reflect initial set-up, support and workshopping
FHRG Development	£50,000	£50,000	£0	£0	FHRG development work on inclusion of Doughnut Economics within Carbon Analyser. Funding concentrated on Years 1 to reflect initial research followed by testing and deployment.
Coverage (demonstrators - locations, use cases/corridors, mileage)	£3,065,000	£800,000	£1,135,000	£1,130,000	Funding profile reflects Year 1 activities focused on mobilisation, establishing foundation and preparing schemes, followed by works starting in Year 2
Doughnut Economics	£319,000	£259,000	£50,000	£10,000	Greater research and development work in Year 1
Doughnut Economics (sector level)	£120,000	£60,000	£30,000	£30,000	Greater research and development work in Year 1
TOTAL	£5,122,000	£1,888,000	£1,680,500	£1,553,500	
Proposed profile		36,86%	32,81%	30,33%	

5.2. Capital & Revenue Funding & Contributions or Match Funding

To add value to our project, we will leverage additional funding commitments and in-kind contributions, including:

Funding from existing capital/revenue budgets: We will use existing local authority budgets to deliver maintenance within the Net Zero Corridors, with the Live Labs funding used to provide the difference between the standard approach and the decarbonised approach. For example, if a maintenance activity normally cost £1,000 and a low carbon approach cost £1,200, we would fund the £200 'extra-over' cost through the Live Labs funding, with the remainder funded through existing budgets. Somerset Council also has an additional £1m capital set aside for utilisation within the Net Zero Corridors.

Accessing external funding streams: We will link our Net Zero Corridors with external funding sources where possible. Examples include:

- **Academic grants/funding:** The University of Exeter has access to funding from the Engineering and Physical Sciences Research Council including the 'Impact Co-Creation Award', 'Knowledge Exchange Fellowship' and 'Impact Visionary Award'. Funding of up to £35,000 is available in each grant, which we would use to support knowledge transfer activities. We will also explore the possibility of knowledge transfer partnerships to conduct research into Circular Economy solutions
- **S106 contributions:** We will use local developer contributions where available to support the delivery of improvements on the selected corridor

- **Future Government capital grants:** We will explore applications for funding from future Government capital grants over the three-year project duration
- **Green Infrastructure for Growth:** Funding from the EU's European Regional Development Fund enabled wildflower planting along one of our chosen corridors in Cornwall. Our corridor will build on this platform to fully decarbonise highway maintenance at the location
- **Links to other funds** - the A38 corridor in Taunton is due to accommodate bus priority works via section 106 and DfT BSIP funds over the life of the Live Labs project as well as active travel investment; and therefore, provides an opportunity to consider decarbonisation across linked programmes on the corridor. Taunton was designated a "Garden Town" in 2017, and with two of our corridors in this town we will explore opportunities to link with garden town initiatives.

In-kind contributions from partners: The project has already benefited from significant pro-bono time from the three local authorities and contractor partners. This is expected to continue across many functions/activities once the project is established. It is expected that this will generate equivalent value of around £500,000 throughout the project duration. Further details are set out in Table 5aa.

Organisation	In-kind contributions
Cornwall Council	Senior Officer involvement in development of concept and collaborative partnership with local authorities and partners. Workshopping, meetings and facilitation of wider authority involvement including political input, S151 Officer review and wider team working. Involvement of the comms team in the bidding phase and providing ongoing and future input to the project.
Hampshire County Council	Senior Officer involvement in development of concept and collaborative partnership with local authorities and partners. Workshopping, meetings and facilitation of wider authority involvement including political input, S151 Officer review and wider team working. Involvement of the comms team in the bidding phase and providing ongoing and future input to the project.
Somerset Council	Live Lab leadership by Senior Officers, including SRO role and lead authority for the Consortium, throughout the bidding, OBC phases and throughout the duration of the project. Development of concept and building collaborative partnership with local authorities and partners. Workshopping, meetings and facilitation of wider authority involvement including political input, S151 Officer review and Operations Teams working on the development of the corridors. Involvement of the comms team in the bidding phase and providing ongoing and future input to the project.
Colas	Involvement in concept development, partnership development, facilitating collaborative working, project management through the bidding phase, programme management supporting the development of the Consortium, bid management, bid writing and production. Ongoing involvement of Operations Director and Client Director as part of the Governance Board
Cormac	Support, advice and attendance at workshops and meetings through the bidding and Outline Business Case phases. Strategic direction and engagement not time-charged to the project.

Milestone	Support, advice and attendance at workshops and meetings through the bidding and Outline Business Case phases. Strategic direction and engagement not time-charged to the project.
Wainwright	Support, advice and attendance at workshops and meetings through the bidding and Outline Business Case phases. Strategic direction and engagement not time-charged to the project.
Brightly	Support and advice on future data collection linked to the FHRG tool.
Circle Economy	Involvement in concept and scope development, provision of advice on Doughnut Economics including workshoping, and advice through the bidding and Outline Business Case phases.
Proving Services (FHRG)	Provision of advice, strategic input and carbon expertise through workshoping and meetings. Reviewing, contributing and advising on the development of the bid, Outline Business Case and approach to carbon analysis.
University of Exeter	Involvement in concept development, including development of the research scope, workshoping, attending meetings and provision of support and advice through the bidding and Outline Business Case phases. Part of the presentation team for the Dragons' Den.

Additional academic partners: work is underway with the FHRG on exploring three potential additional academic partners. This includes investigation into trialling a fuel mix to use with existing equipment, with potential for significant carbon savings. Additionally, funding is also being explored for innovation funds to trial the use of quarry waste (granite and basalt).

5.3. Acceptance of Financial Responsibility and Sources of other Funding Contributions and How Funding has been Secured

The funding recipients across the authorities are contained in the following table and are further detailed in the Commercial Case. Acceptance of financial responsibility by the three authorities, through Section 151 officer declarations, has been included in the Commercial Case along with a procurement plan.

Table 5b		
Activity	Funding Recipient	Grant Allocation
Construction		
Somerset Demonstrator Corridor works	SC	£1,021,000
Hampshire Demonstrator Corridor works	HCC	£1,021,000
Cornwall Demonstrator Corridor works	CC	£1,021,000
Programme Management		
Local Authority Resources	SC	£215,000
	HCC	£190,000
	CC	£190,000
Programme Management	SC	£335,000
Carbon support	SC	£90,000
Design		
Carbon Assessment & Certification	SC	£186,000
Doughnut Economics and Circular Solutions	SC	£439,000

	SC	£50,000
Carbon Budgeting and Scenario Planning	SC	£362,000
TOTAL		£5,120,000

5.4. Long Term Financial Viability

How the proposal will be sustained beyond the lifespan of the project: The development of the Live Lab has considered the need to continue the benefits, impact and work beyond Year 3. This will be achieved through the following activities:

- Seeking and securing additional funding started during the bidding phase. This will continue throughout the project with the aim of financing the legacy phase, supported by a process embedded in the management of the project. The Project Manager will be responsible for this process. Long-term funding opportunities will be a standing item at monthly project meetings and the quarterly Consortium Board. Partners' networks, knowledge and access to funding sources will be leveraged
- As the Live Lab progresses, interest in the work will be generated through activities such as comms, thereby increasing the likelihood of securing additional funding. In addition, the work involved may lead to future 'legacy projects' that may qualify for alternative funding streams. For example, it is anticipated the work on Doughnut Economics, linked to the development of a sector-level model, will generate interest across academia and industry as awareness of the model increases, and lead to the identification of legacy projects on specific areas of development
- Establishing the Learning Circle and Shared Hub for collaborative working will create communities and platforms for ongoing learning, sharing and dissemination. These will not be limited to the length of the project.

How benefits will endure beyond the period of the scheme without any further funding: The ToC (as detailed in the Strategic Case) and the Economic Case set out the anticipated impacts of the Live Lab. When establishing how the long-term benefits of the Live Lab will endure unfunded, these impacts have been examined.

Table 5c	
Impacts set out in ToC	Ensuring benefits endure beyond 2026 without further funding
Reduced impact on climate through decarbonised highways network, with all maintenance activities focused on measured decarbonisation	The efficiency and carbon savings, projected over the local and UK network, and achieved through both the work on the Corridors and future application of the developed methodology and toolkits will continue. Local policies and processes amended during the Live Lab as part of transition to BAU, will continue after the project.
Far reaching impact on decarbonisation across the sector/neighbouring sectors through use of developed methodology, scaled up to learning, toolkits and guidance	The sharing and collaborative working undertaken throughout the project will build an enduring network that can continue without additional funding. The dissemination of toolkits and methodology will support this. The scalability of the successes of the Live Lab will mean they are replicable across the wider network without requiring further funding.
Connecting strategy, planning, funding, specification and delivery in a whole lifecycle approach	Evaluation of proposals would consider the same cost or less for reduced carbon, and only where we think costs will reduce in the long term employ more expensive methods, materials for carbon reduction.

Transformed BAU approach to roads and service delivery, carbon budgeting and M&E	The Live Lab will develop new BAU in these areas and therefore won't need explicit funding as it will become routine work.
Balance is achieved between social, environmental and economic factors	The work on the application of Doughnut Economics at a geographic level will embed the balanced approach to social, environmental and economic factors into processes that include decision making, policy formulation. Procurement and forward planning. The new methodology will transition to BAU during the project.
UK an international exemplar for decarbonised local roads and pioneer in net zero	The comms activities undertaken by ADEPT, supported by those of the Live Lab, will position the work of the Live Lab on the UK and international stages. The reputation as an exemplar of decarbonised roads will continue without further funding as the successes are scaled up and replicated across the UK's network.
Behavioural changes across the industry and public acceptance of decarbonisation activities	Over the three years of the Live Lab the comms activities, coupled with the development of green skills within the authorities and partners, will develop behavioural changes and acceptance of decarbonisation work. The adoption of toolkits and methodologies will support this.

6. The Management Case

6.1. Governance Structure

Since the inception of the thematic programme, we have united around as a Consortium around a common vision that the power of this approach lies in the opportunity to:

- Leverage synergies and standardisation across the three individual Live Labs
- Accommodate any differences in local authority policies and processes, as well as those emerging during the programme, to address specific local requirements.

Development of an effective governance structure to reflect this vision has been underpinned by the commitment to the MOU signed by all three authorities and submitted to ADEPT. The overarching governance structure is set out in Figure 6a below, the structure diagram illustrates how the development of the Consortium has enabled the sharing of roles and activities.

To oversee project delivery, we will establish a robust governance structure. A Steering Group will be established from senior members of each local authority to set the strategic direction and act as a point of escalation for any issues that arise.

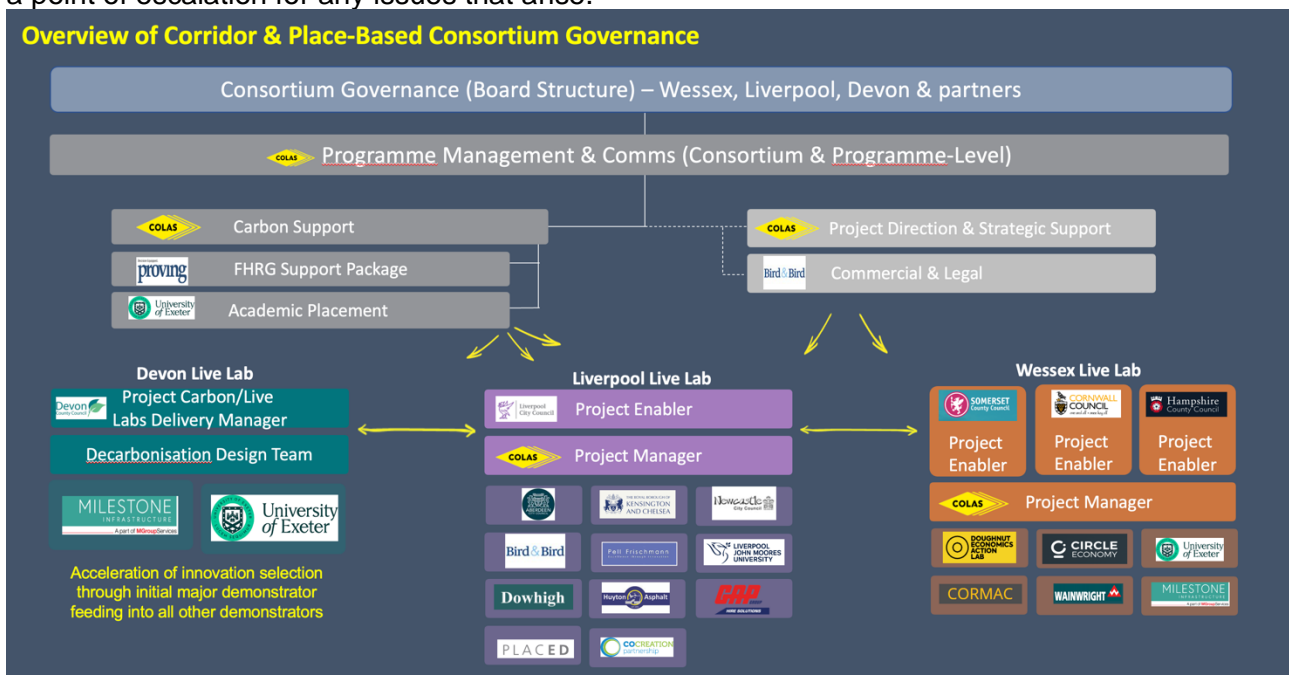


Figure 6a: Structure and roles for the Consortium governance structure

The structure and terminology are based on the principles of Managing Successful Programmes and PRINCE2 project management, taking a tailored approach to implementing these methodologies and safeguard the project outcomes. It is this tailored approach that enables both the flexibility to interface effectively with existing local authority assurance processes, as well as practical alignment with the overall structure and governance of the Live Labs programme and cohort by ADEPT. We recognise that rapidly establishing these communications channels is vital for the cross-pollination that will drive the sector-level impacts. This tailoring also extends to the terminology, which diverges from pure MSP and PRINCE2 where necessary to remain logical in the wider Live Labs context, and also recognises the different level of training across project teams.

6.2. Roles, Accountability and Resource

Our proposal will bring together a team of local authorities, contractors and academic partners to deliver the project elements. All partners are committed to the project and have signed a project-specific Teaming Agreement. Our Net Zero Corridors will be managed by the local authorities, with works delivered through existing maintenance contracts by partner term contractors. The unique

development of Doughnut Economics and the FHRG project element will be integrated and delivered by our committed academic and research partners.

The Senior Responsible Officer is Mike O'Dowd Jones. He will be responsible for the following key roles:

- **Programme Manager (Colas):** This part time strategic role will oversee the project at a senior level, ensuring continuity of approach and collaborative working from the bid stage continue throughout the delivery phase. The formation of the Consortium means this role is shared with the Liverpool Live Lab and provides Consortium-wide support as required
- **Project Manager (Colas):** This role will coordinate between the various partners, managing risks and ensuring project delivery remains in line with both the programme and budget
- **Local Authority Enablers (one for each local authority):** These will manage the project for each local authority, bringing together existing resources such as the works programming and asset management teams. This role will act as an enabler, embedding a decarbonisation culture within the local authorities' highways services.

The project will be supported by the following delivery resources:

- **Existing local authority highways departments** (such as asset management teams), who will carry out their normal roles across both the corridors and the wider network. With support from the Local Authority Coordinators, they will select the new ways of working that are to be trialled in their corridors
- **Existing local authority communications teams** (potentially supported by commissioned PR support, shared across the Consortium): This role will oversee the communications and marketing aspects of the Live Labs project in collaboration with the local authorities' existing teams, including our knowledge sharing proposal detailed in a section below
- **Carbon Innovation Lead (shared resource across the Wessex and Liverpool Live Labs):** This role that will work alongside the existing local authority teams, specifically to identify the innovative low carbon solutions to be trialled in the Net Zero Corridors
- **Term Contractors** and their supply chain to deliver work in the corridors with existing resources (but with consistent monitoring across corridors to enable comparability). Specialist suppliers will be added as appropriate to deliver low carbon solutions.

In addition, the academic/research resources are:

- **University of Exeter** will deploy Professor Xiaoyu Yan and recruit an additional Postdoctoral Researcher for their carbon budgeting and scenario planning activities
- **Circle Economy's** activities will be delivered by their team, led by Ilektra Kouloumpi
- The **FHRG**, whose team will deliver research under leadership of Simon Wilson with support from Cranfield University
- **Colas, Wainwright and OCL** will bring their research and development capacity and intelligence to create technical solutions for the corridors.

6.3. Delivery Arrangements

The delivery arrangements for the three authorities are set out in the following section.

Somerset Council: Somerset operates the Commissioning Model, where the Commissioners set the outcomes and associated budgets for the highway service. The service is delivered by the Operations Team utilising several contracts, namely, a signals contract, a highways lighting contract, a structures framework and a Term Maintenance Contract (TMC) which covers structural, cyclical and reactive maintenance and new asset build. Post April 2024 the current TMC will be come to an end and will be replaced with sperate contracts for Surfacing, Surface Dressing, New Assets, and core TMC Services.

Cornwall Council: Under the Council's current contract, Cornwall Council commission their contractor, Cormac, via task orders and contractor response forms. We issue individual scheme briefs if their a programme of work, keep track of our scheme programmes using scheme manager.

software which is linked to our ordering and payment mechanisms. We carry out routine audits of schemes upon completion and at an 11-month period and have a suite of KPIs to ensure compliance.

Hampshire County Council: Annual budgets are allocated by the Commissioning Teams for individual areas of the service. All work is designed by HCC staff and managed by individual Delivery teams. Work is allocated to the main contractor (Milestone Infrastructure Limited) via task orders and individual teams manage the day-to-day delivery of the respective areas of the service. Overall delivery is supported by a Board structure that incorporates an Operations Board and a Strategic Board responsible for the strategic leadership of the highways service and contract.

6.4. Live Lab Progress Reporting Arrangements

The process for reporting progress at the Programme, Consortium and Live Lab levels will be undertaken in the spirit of Prince2 Project Management and Managing Successful Programmes methodologies.

Local reporting at both Consortium and individual Live Lab levels will mesh with ADEPT's overarching Live Labs programme cadence, and the combined cadences are set out in Table 6a. For example, the Project Team Meeting will meet every two-weeks, interleaved with ADEPT's Technical Meetings, and provide the conduit for reporting progress via Highlight Reports.

Templates for the reporting tools (progress reports, highlight reports and exception reports) will be used to ensure consistency in reporting.

Table 6a		
Meeting	Frequency	Mechanism for Progress Reporting
ADEPT Commissioning Boards	Quarterly	Summary Report from the Consortium & Wessex Live Lab.
Consortium Steering Group	Quarterly	Progress Reports to the Consortium Board from the Live Lab Programme & Project Manager.
Consortium Comms Leads Meeting	Quarterly	Comms Plan Progress Report.
Wessex Live Lab Strategic Meeting	Quarterly	Progress & Exception Reports to the Project Board from the Project Manager.
ADEPT Programme Technical Meeting	Two-weekly	Highlight Report from the Project Manager.
ADEPT Programme Comms Leads Meeting	Two-weekly	Highlight Report from the three authorities' comms leads.
Wessex Project Team Meeting	Two-weekly	Progress Reports from the Enablers.

6.5. Senior Level Support from Partner Organisations

Statements from the Senior Responsible Owner, Mike O'Dowd Jones, and the Political Champions of the three authorities are included in the following Table 6b. In addition, a signed declaration from the three Section 151 officers is included in the Commercial Case.

Senior level support was previously demonstrated in the letter sent by the Cabinet Members from all three partner authorities in support of the original proposal and submitted in November 2022. Video recordings of statements of support were included in the presentation to the Live Lab 'Dragons' Den'. Additionally, a signed MOU from the five authorities in the Consortium was submitted to ADEPT in November 2022.

Table 6b**Senior Responsible Owner****Name:** Mike O'Dowd Jones**Role:** Highway and Transport Commissioner**Email:** mike.odowdjones@somerset.gov.uk

Statement of support: "Somerset County Council is pleased to have acted as a catalyst along with Colas in bringing together an innovation partnership with the capability and drive to deliver a definitive Live Labs programme. Together we aim to deliver Net Zero Corridors across Hampshire, Cornwall and Somerset, and influence sector practices going forward. Somerset County Council is pleased to act as lead authority to drive the work forward and envisages that funding agreements will be reached between DfT and each of the three local authorities for ease of accounting. As Senior Responsible Officer for the programme I commend the business case to you and confirm all the Partners' commitment to deliver".

**Political Champion****Name:** Cllr Mike Rigby**Role:** Executive Member for Transport and Digital, Somerset Council

Statement of support: "Live Labs 2 provides us with a unique opportunity to come together and thoroughly explore what can be achieved in decarbonising local roads across a 'test-bed' which offers a range of different geographies, access to materials, access to recycling facilities and forms of contracting with the construction industry. Our learning will be immensely valuable at a sector level and we hope will move the highways industry forward significantly in its working methods, treatments and materials to deliver Net Zero Corridors and tackle the Climate Emergency. As the elected representatives of our communities, we must ensure that decarbonising highways is affordable by becoming 'business as usual' as soon as possible and we are committed to working with your Department, ADEPT, and our partners over the next three years to achieve this".

**Political Champion****Name:** Cllr Connor Donnithorne**Role:** Portfolio Holder for Transport, Cornwall Council

Statement of support: "Cornwall Council look forward to working with Somerset Council, Hampshire Council and delivery, educational and research partners, to deliver a series of Net Zero Corridors via the Live Labs 2 programme. In January 2019 Cornwall Council declared a Climate Emergency with a target of being a net zero authority by 2030 and in November 2021 it declared an Ecological Emergency. At some 7,330km in length Cornwall's Highway network, its usage and how we maintain the same play a key role in addressing these emergencies. The Live Labs 2 programme gives us an ideal opportunity to work with other authorities, research and delivery partners to determine best practice and how we can replicate this on the rest of our Highway Network and the highway network of other Highway Authorities".

**Political Champion****Name:** Cllr Nick Adams-King**Role:** Executive Lead Member for Universal Services, Hampshire County Council

Statement of support: "Hampshire County Council declared a Climate Emergency in June 2019 with a target of becoming carbon neutral by 2050. The County Council has also, uniquely, set a target to build resilience to the impacts of a two-degree Celsius rise in temperature. Action on climate change is being actively embedded across all County Council's services, influencing policy and the way decisions are made to help shape a healthy, resilient, and prosperous future for Hampshire. As part of this, our highways maintenance service, in collaboration with our delivery partner Milestone Infrastructure is targeting a 60% reduction in carbon emissions by 2030. The Live Labs 2 programme will provide a great opportunity to share, develop, test and

implement new ways of working that will not only reduce carbon emissions in our respective authorities but will provide valuable learning for the wider highways sector”

6.6. The Project Plan

A high-level project plan has been developed into a Gantt Chart, included as Fig 6b. This Chart reflects the budget profiling set out in the Financial Case and provides additional detail on the activities for each work package. It assumes the start date of May/June 2023, with mobilisation taking place in Year 1 of the 3-year timeline.

- **Year 1** - will focus on mobilising and establishing a solid foundation of understanding, collaboration and research
- **Years 2 & 3** - will build on the foundation established in Year 1, and work on the Corridors will begin
- **Legacy tail** – the Live Lab project will close, and the follow-up legacy activity over a 5-year tail will be undertaken by ADEPT.

Figure 6b Gantt Chart

Wessex Live Lab - deliverables		Financial year 1 (2023 - 24)				Financial year 2 (2024-25)				Financial year 3 (2025-26)				Legacy
Work Packages	Activity	Qt 1	Qt 2	Qt 3	Qt 4	Qt 1	Qt 2	Qt 3	Qt 4	Qt 1	Qt 2	Qt 3	Qt 4	5-yr tail
Project management														
	Mobilisation - recruitment, project set-up & documentation													
	Project Management (incl project resilience, resource management & development, monitoring & reporting)													
	Establishing governance and ongoing governance													
	Local Project Enabling activities (local authority)													
	Project Direction (Consortium & Live Lab)													
	Additional funding search and selection													
Legal/Contract Support														
	Identification and resolution of legal and contractual issues													
Comms														
	Review & refine Comms Plan													
	Local comms activity, stakeholder engagement and content creation													
	Participation in DfT/ADEPT national comms activity													
	Launch Learning Circle and collaborative platform													
Demonstrators - delivery of net zero corridors														
	Log existing toolkits, guidance & best practice													
	Define and action data collection plan													

	Research & innovation search & selection												
	Validation of corridor selection												
	Baseline of corridors & lifecycle analyses												
	Works assessment & forward planning												
	Lifecycle management (eg design, procurement)												
	<i>Corridor 1 - initial trial</i>												
	<i>Corridors 2 - 3</i>												
	<i>Corridors 4 - 5</i>												
	<i>Corridors 6 - 7</i>												
	<i>Corridors 8 - 9</i>												
	Toolkit development & dissemination												
	Toolkit application												
	Data gathering, recording & management												
Application of methodologies - Doughnut Economics, Circular Economy & ToC													
	Portraits of Place, DE toolkit development, application to corridors												
	DE toolkit application												
	Training												
	Refinement and review of Theory and Practice of Change												
Doughnut Economics - sector level and local scalability													
	Develop sectoral toolkit and methodology												
	Participatory process (engagement, networking, research)												

	Reporting, publishing & sharing													
Carbon M&E (research & development) - led by University of Exeter														
	Establish postdoctoral research programme													
	Undertake and review carbon scenario planning													
	Carbon budgeting - research, development and testing													
Carbon baselining, analysis, M&E														
	Establish local M&E framework (locally and linked to national M&E)													
	M&E data provision and support for national M&E													
	FHRG Support package (including set-up within authorities)													
	Application of Carbon Assurance Process													
	Annual FHRG waypoint assessments and final statement													
	Dissemination of learning													
	FHRG Research & development (DE Option)													
	Carbon analysis support													

6.7. Draft Risk Register

The Live Lab Risk Register (shown as a thumbnail in Fig 6c and attached as ‘Appendix 2 – Q6.7 Risk Register’) follows the Red-Amber-Green (RAG) assessment methodology matrix which considers both impact and likelihood. This will be managed as part of the project management processes.

WESSEX RISK REGISTER								
Description of risk	Impacts and consequences	Pre-mitigation risk			Mitigation and/or contingencies	Post-mitigation risk		
		SEVERITY	POTENTIAL	RATING		SEVERITY	POTENTIAL	RATING
Disconnect between LA and private sector/commercial stakeholders, to embed solutions/concepts into BAU workflows.	Full potential not proven during trials, with reduced uptake and roll-out at scale. Solutions not embedded in BAU.	4	5	20	Governance structure facilitating collaboration. Review of BAU aligned with development of collaborative processes, toolkits, guidance and training. Innovations managed and banked in Log.	3	2	9
Communities feeling adversely impacted by new ways of working.	Public complaints & dissatisfaction.	5	4	20	Consideration of community impacts during planning, assessment of social impacts using DE. Comms role, with associated comms plan supporting public engagement.	3	3	9
Innovations in materials and techniques are not achieved in time, or locally available, to form part of the delivery programme.	Reduced levels of innovative materials and techniques incorporated in programme.	3	4	12	Innovations identified and logged with timescales. Requirements for innovations across corridors mapped. Programme linked to innovation timescales.	3	2	6
Complexity of the programme and failure of the large number of participants (including other networks) to coordinate the activity required to deliver the intended outcomes.	Intended outcomes not delivered.	4	5	20	Dedicated project manager supported by project director. Project enablers appointed within each authority. Governance/meeting structure facilitating collaboration.	3	3	9
Legislation (eg financial and procurement regulations) are not agile enough to achieve the desired level of innovation.	Reduced impact of programme on decarbonisation.	3	3	9	Legal/commercial support assigned to the project. Identification of legislative barriers and actions planned during mobilisation.	2	2	4
DfT or technical audit processes will not approve/facilitate changes to standards.	Reduced impact of programme on decarbonisation.	3	3	9	Required changes to standard flagged to DfT during programme planning. Impact of change versus BAU added to case for change.	3	2	6
Complexity of the programme and failure of the large number of participants (including other networks) to coordinate the activity required to deliver the intended outcomes.	Challenge reaching commercial arrangement to facilitate roll-out at scale.	3	3	9	Innovation management embedded into governance. Clearly defined IP outputs with individual exploitation routes. Strong existing relationships.	2	2	4

Figure 6c: Draft Risk Register

7. The Carbon Case

Our corridors will enable a net zero future by providing an insight into the service areas where further decarbonisation is needed. Through the rigorous, and independently verified, monitoring of carbon emissions across the whole scope of highway services, it will become clear which activities are the most challenging to decarbonise. The underlying principle of the Live Lab is nine Net Zero Corridor trials over three years will be proxies for each authority's overall highway network, which in turn are proxies for the UK local highway network. The trial corridors were selected to be representative of the range and type of each authority's network and represent around 1% of each. The total combined length of the three authority's networks is 19,000km which represents 2% of Britain's local highway network.

7.1. Expected Carbon Benefits

Carbon emissions will be measured at every stage of the project to enable the success of our approach to be monitored and evaluated in both qualitative and quantitative forms. Key to this will be the reliability and accuracy of our calculations. Through calibrated carbon analysis and the rigorous and independent assessment of carbon benefits and disbenefits we will examine the: costs, technical readiness, operational performance and stakeholder support. The following sections detail how this will work be undertaken.

The planned Monitoring & Evaluation (M&E) activities are set out in detail in the M&E section of the Business Case. Additionally, the Economic Case sets out the potential key impacts of the trials, including but not limited to carbon, and how value for money will be considered throughout the process. Until the Live Lab's research work starts, we are unable to quantify the benefits robustly.

During the development of the proposal and Business Case (particularly the Carbon and Economic Cases), work was undertaken to explore the anticipated carbon benefits and the likely impact at both local and UK scales. To examine the likely impact of the Corridors an illustrative hypothetical corridor was defined, as a representation of a 10km stretch of the network and encompassing many of the characteristics identified when selecting the nine Corridors. An analysis was undertaken and although based on a hypothetical scenario, with many unknown variables, the results provide an illustration of the potential carbon benefits. It is also an early demonstration of the approach to be taken. This is further detailed in the Economic Case.

Initial illustrative assessment showed maintenance of a typical 10km corridor could have a carbon baseline of the order of 17,000 kg CO₂e and that a reduction in emissions of the order of 30% might realistically be achieved on a corridor through a combination of changes in scope & scale of activities, changes in frequency of activities, experimental processes, materials and fuels. Each change will have its own carbon impact, many of which will exceed the hypothetical 30% reduction (such as amending ways of working to reduce the number of times sites are visited, reducing the frequency of planned treatments, using materials with lower embedded carbon, increasing the use of more durable treatments etc). It might be that more radical intervention will be achieved which will deliver greater change, but for the purpose of this initial business case it was concluded that this figure is realistically deliverable. Benefits will be derived from changes across the full range of maintenance activity including cyclical grass/ vegetation cutting, inspections and emergency response, pothole repairs, resurfacing and surface dressing, drainage and gully maintenance, structures, signals, signs and lines.

7.2. Approach To Carbon Measurement Across The Lifecycle - Tools, Methodology & Source Data

Tools and Source Data: A lack of standardisation of carbon measurement, accounting and reduction has led to a highly fragmented approach across the UK's highways sector. During the preparation of this submission, our contractor partners held a workshop to assess the alternative options in the sector, including but not limited to:

- **Future Highways Research Group (FHRG) Carbon Analyser**, a research-led, web-based carbon profile builder and carbon analysis toolkit, tailored to provide carbon case assurance specifically for the highways sector

- **National Highways Carbon Calculator**, a tool used to capture emissions for construction and maintenance works delivered on the strategic road network
- **asPECT**, a tool developed by TRL, Highways England, the Mineral Products Association and Eurobitume UK. asPECT is used for the carbon footprint of asphalt road pavements
- **SEVE**, an emissions comparison calculator for surfacing and earthworks, managed by Routes de France. SEVE uses a range of data including how materials were transported and plant/equipment on site
- **Sustainability Tool**, a tool that uses the UK Government conversion factors and BATH ICE conversion factors for construction materials.

This assessment of options enabled the team to select the Carbon Analyser as the tool to be used for the Live Lab and to develop a partnership with the FHRG. The Analyser has been extended to support the Live Labs 2 programme with a range of additional features.

Guidance will be provided by FHRG through direct involvement with the team and the Carbon Calculation and Accounting Standard (CCAS). The guidance is across GHG Scopes 1, 2 and 3 and based on the relevant GHG, BSEN ISO 14001, PAS 2060, PAS 2050 and PAS 2080 (April) standards.

We will be supported with data export and import for the Carbon Analyser by the software providers Brightly. This will align data held within the Confirm software system with the FHRG calculator. Where data is held in other software, additional export methods will be employed. The data required, sources of this data and methods to capture it will be further explored in a mapping exercise with partners during mobilisation.

By using a single tool, pulling together all data sets, we will ensure consistency between Net Zero Corridors – enabling effective comparison of the different approaches we trial. This project will demonstrate the Carbon Analyser in a real environment. Where we identify any current gaps in the tool, we will provide feedback to FHRG to support continual improvement. Alternative tools will be assessed as potential solutions to gaps.

Methodology - carbon measurement across the lifecycle: As set out in the Strategic Case we will take the dual approach of considering both individual elements (carbon components) and the whole system to drive emissions down and out of the maintenance lifecycle. Our approach will consider the whole system carbon and investigate the impact decision-making processes for annual maintenance programmes have on emissions. The carbon measurement carried out will enable assessment of the long-term sustainability credentials of the new and novel materials and techniques trialled and through iterative learning enable each phase of work on the Corridors to build on the last.

Where the carbon assessment shows a trial intervention has proved inconclusive, or we have been unable to reduce a carbon component in the whole carbon maintenance lifecycle, we will report this with a commentary for the sector. We will take this forward and document what was considered, discounted and tested to extract the maximum value from the trials.

During mobilisation a Year 1 carbon baseline will be identified for each corridor in the trials. This will enable to work to sequentially address (from the largest to smallest) each element of carbon emissions in the reported baseline. Each emission element will be broken down in terms of its cause, need and presence to consider in a consistent hierarchy outlining how the emission can be eliminated, reduced or mitigated.

Methodology - exploring Carbon Budgeting: Our consortium partner, the University of Exeter, will lead a project exploring the use of carbon budgets in highways maintenance and how this interacts with the routine measurement and evaluation of our carbon footprint. Through this research and with learning from the Corridors, we propose to pilot the use of carbon budgets during the project period.

This work will support local authorities in preparing for the potential introduction of carbon budgeting. The concept of carbon budgets for local roads could be introduced to drive

decarbonisation nationally – with the potential for future Department for Transport funding to be allocated within a Carbon Budget.

Trialling carbon budgeting will support our iterative reduction in carbon. Using our baseline carbon footprint, we can then set a “budget”, using future scenario planning to assist with the assessment of how we can achieve this. The carbon budgets will be progressively reduced to drive our highway services towards net zero – both within the corridors and across the wider local authorities’ highway networks.

The mechanism for achieving this will be explored as part of the research, however we propose the budgets are calculated from the carbon footprint data collected in the FHRG Carbon Analyser during baselining and monitoring.

Methodology - Carbon and Applying Systems Thinking through Doughnut Economics:

Uniquely to our project, we will also develop the FHRG tool to include Doughnut Economics. Working in partnership with the FHRG, we will build the model into the tool. The Doughnut Economics model will support a future-ready approach to decarbonisation.

The model will enable the sector to make informed decisions that consider the interrelationship between the environment, society and economy – and not just carbon reduction in isolation. For example, high friction aggregates are becoming scarce from UK sources but continue to be used due to safety concerns and societal issues. This will look at identifying and making visible the true costs of activities by factoring in social and environmental costs, that are currently 'hidden costs'.

Our use of Doughnut Economics will enable us to manage the conflicting demands and drive highway activities towards sustainable outcomes and build a toolkit to understand the wider implications of decarbonisation and enable carbon budgeting to be achieved sustainably. This includes how Doughnut Economics could link to the use of marginal abatement curves, in the context of identifying the optimum changes to reduce carbon and the cost of those changes, set against BAU and the longer-term cost per tonne of carbon reduced.

Methodology – the Carbon Assessment Process: To provide a robust framework for the carbon assessment work we will apply the assessment process developed by FHRG for this Live Lab. The process encompasses four phases of assessment to provide an end-to-end evaluation of the carbon impact of the work on the Corridors. The process will be embedded in the project management of the Live Lab to align with wider processes, such as reporting to the Quarterly Board. These phases and the alignment to the work of the Live Lab are detailed in the following sections:

Project Prioritisation & Assessment (Phase 0)

A range of options for materials, products and methods of working will be identified as part of the research work undertaken for the Live Lab. To select the optimum carbon reduction interventions, we will undertake attractiveness and achievability assessments against a broad range of factor sets. To prioritise, compare and record the outcomes a scorecard will be used.

It is important for the success of the Live Lab that the analyses provide insight and understanding of the links to strategic aims, the scalability of the options and wider social and planetary factors, in addition to the carbon impact. Three types of analysis will be undertaken:

- Attractiveness Analysis
- Achievability Analysis
- Sustainability Analysis.

Uniquely for this Live Lab a third analysis, a sustainability assessment that incorporates Doughnut Economics, is being developed by FHRG with the support of Exeter University and Circle Economy. This will cover wider social and planetary factors and take a systemic approach to both intended and unintended consequences of decisions and options.

Carbon Baseline Estimation (Phase 1)

To develop an understanding of where to focus the interventions, provide comparators for before and after interventions and to develop the iterative learning it is critical to establish carbon baselines for the Corridors.

During mobilisation we will identify the current carbon baseline, and the carbon footprint of each Corridor, and monitor the carbon reduction achieved as we implement new approaches. We will produce a Carbon Footprint Statement, initiated by a Readiness Review and progressed through workshops covering the following areas:

- Carbon & activity boundaries, data requirements and sources
- Fleet, staff & operatives
- Carbon profiles for works & experimental profiles
- Carbon footprint & strategy review.

This will establish a baseline carbon profile through a baseline confidence assessment and identify the evidence underpinning the assessment. Data will be collected throughout delivery to assess performance. The scope will be aligned with FHRG guidance documents, international standards and the specific scope of our corridors.

Data will also be collected on the wider impact, such as technical surveys and customer feedback, to identify any barriers to decarbonisation. We will compare the different locations of our corridors to understand local challenges, whether due to geography, volume of work delivered, contracting/delivery models, network pressures, political priorities, access to materials or other factors. Monitoring will also support future scaling up of the methods.

The baseline will be established for the complete year before the start of work on the Corridors and include all works that will be in scope of our Live Labs project. Each corridor will have its own benchmark to capture the unique characteristics of the locations. As the corridors will each include a planned maintenance scheme over the three years, we will ensure a baseline for this activity is captured to enable like-for-like comparison.

Once a corridor is in place, we will measure the actual carbon generated by the activities we carry out. Data will be collated from various local authority systems (e.g., Confirm) and input into the Carbon Analyser to quantify the carbon footprint. FHRG will conduct an additional independent carbon footprint waypoint assessment on an annual basis and provide detailed feedback.

Carbon Profile Evaluations (Phase 2)

To select the solutions to implement, our Carbon Innovation Lead (recruited for this project) will use carbon measurements to guide decision making. Through an optioneering process, we will input the data of several proposed solutions into the Carbon Analyser to understand the emissions profile of each – including a forecast of the carbon emissions across the asset's whole life.

Built-in functionality will then enable comparisons of alternative policies, standards, specifications, materials and methods. We will then use this information to select the approach that best meets the decarbonisation target. As the Live Labs project progresses, we will record actual carbon emissions from delivery to inform our future optioneering processes and support further decarbonisation across the Corridors.

This work will identify the operational parameters, goals, and carbon targets of each project. This approach will continue as the Corridors progress and activities will include:

- Establishing the baseline carbon profile, then used as the “standard profile” or “control profile” for future comparison.
- Examining the scope and scale of the project
- The anticipated carbon benefits and / or dis-benefits
- Any additional benefits and / or dis-benefits.

This approach will support the identification of innovations. The carbon baseline captured at the start of the project will provide a detailed insight into the activities that have the largest carbon footprint. These will then be targeted for alternative approaches, including novel materials and

methods. Working with all partners and the wider sector innovative approaches will be identified for use in the corridors. We will follow the PAS2080 systematic approach to reducing carbon impacts, with innovations in manufacturing, deployment and operation.

Innovations used will include existing innovations already available in the highway sector, ideas leveraged through the global reach of our contractor and academic partners, or innovations from the wider Live Labs cohort (who we will invite to test their solutions in our corridors as a supplier to our term contractors).

Annual reporting and project-specific carbon assessments (Phase 3)

The impacts of change will be measured directly in most cases during the live trials and reported annually as an overall summary. For example, the Year 1 outcome will then become the Year 2 baseline. It is envisaged that the Year 1 outcome will be greater than the Year 2 baseline as further reductions will be identified in the trial analysis.

These annual 'Waypoint' assessments will be conducted with FHRG and involve assessment of the baseline profile with the experimental profiles generated for the work within the Corridors. This will enable the benefits to be compared like-for-like.

The results will be incorporated in annual reporting, sharing and dissemination of learning through both local and wider channels, in collaboration with ADEPT and through partners' platforms including FHRG's network.

Close-out & link to both M&E and Comms (Phase 4)

As the project closes an updated carbon footprint statement will be produced for the work undertaken throughout the Live Lab. This statement will be included in a closing report that informs the wider sharing and dissemination of the lessons and successes of the Live Lab to the local, UK and global audiences. This links to the wider M&E activity and the Comms Plan (detailed in other sections of the Business Case). Additionally, it is envisaged the final statement will help guide the legacy activities undertaken by ADEPT in terms of ongoing M&E and comms.

7.3. Approach to Quantification of Residual Emissions

Residual emissions are included within Carbon Analyser as emissions without any achieved reduction or without stated carbon reduction actions (based on the current portfolio of reduction initiatives within the Analyser). To ensure comprehensive analysis and reduction strategies are adopted, residual emissions are red-flagged if they exceed 15% of the total emissions in any context. All red-flagged emissions will be subject to further scrutiny and reported through exception reporting to the project meetings and Board. Red-flag Challenge sessions will be held with the wider team to focus the search for further innovation and learning. Sharing this learning across the Live Lab cohort will further support the identification of solutions.

7.4. Academic & Industrial Partners and Collaborative Working

The academic and industrial partners assisting with the processes outlined in this Carbon Case are detailed in the Table 2b in the Strategic Case. The partners will work collaboratively to ensure the research, methodologies and tools are not only complementary but also build on and enhance the work of each. For example, the research undertaken by Exeter University will provide input to the development of the Carbon Analyser and support calibration of the the toolkit. Additionally, the work of both Exeter University and Circle Economy on the application of Doughnut Economics for the Live Lab will be an integral to the work on specifying, developing, testing and embedding DE within the Carbon Analyser.

8. Equality Impact Assessment

All partners in the project are committed to equality, diversity and inclusion (EDI), with policies and/or strategies in place to ensure our workforces are representative of the communities in which they work. This will ensure each stage of the project (from strategy through to delivery of works on the ground) benefits from a wide set of insights, perspectives and experiences.

During the development of the proposal, we engaged diverse partners including local authorities, contractors and academic/research bodies. This broad range of backgrounds has ensured that we are inclusive of ideas from different demographics, as well as individuals both inside and outside the highways sector. For example, our collaboration with the University of Exeter will drive success by bringing insight from their work in the energy, transport, manufacturing and food sectors and Circle Economy bring worldwide experience.

To deliver this project, we will recruit additional staff to support existing local authority teams (as outlined in the section above). Recruitment will be compliant with our partners' EDI policies to remove barriers to employment and therefore ensure we have a diverse project team. We will also carry out a team analysis in mobilisation using tools such as Colourworks to balance teams' diversity as part of the recruitment programme.

We will be inclusive of the views of local communities, to ensure any changes we make are positive for everyone. Within the large geographic area of Somerset, Cornwall and Hampshire, communities vary in terms of deprivation and demographic profile (including age, race and gender). We will monitor EDI within the corridors to ensure that outcomes can be scaled up successfully in the future. We will engage and inform stakeholders in the Net Zero Corridors to ensure awareness of the changes to our delivery methods in their area.

EDI will also be embedded in decision making through the Doughnut Economics Model, which we will use as a core tool to decide on how we decarbonise highways services. The model encourages a holistic view of both social and environmental outcomes. There are eleven social elements in the Doughnut Economics Model (based on the United Nations' Sustainable Development Goals), including social equity and gender equality. Therefore, by using this model, EDI will be a central part of all decisions we make.

Implications for people with protected characteristics have been considered through the Equality Impact Assessment undertaken for the project, and no adverse impacts have been identified. The assessment has highlighted that a well-maintained highway network includes roads, footways, lighting and other assets which provide a safe environment for potentially vulnerable people who are typically older or younger people and may include women or girls.

A well-maintained highway network also provides a safe environment for people with disabilities, particularly wheelchair users or those with impaired vision. Any proposed changes to working practice or specification arising from this programme will need to carefully consider impacts on these groups, for instance if changes to lighting, design, materials or signing etc. are proposed.

The precise changes that will be made are not known at this stage but will be identified as the programme is undertaken, based upon a carbon assessment identifying where the greatest opportunities to reduce carbon are within existing operations.

The project enablers will ensure that an equality impact assessment is undertaken in association with any significant proposed change to working practice or specification arising from the programme. Relevant stakeholder groups including people with protected characteristics will be consulted as part of this process. Any identified impacts on people with protected characteristics, together with any necessary mitigation, will be considered by the programme board prior to adopting new practices.

9. Monitoring And Evaluation

9.1. Overarching Methodology

To demonstrate that DfT funding is spent well and delivers value for money, tangible benefits and achieves the stated aims of the Live Lab, evaluation will take place throughout the life of the project and beyond into the legacy tail. Further details are set out in the Strategic and Economic Cases. All partners will participate in the development, data gathering, and evaluations involved, echoing the collaborative approach taken across all Live Lab activities.

There will be three interwoven strands of activity:

- **Local - Live Lab:** undertaken by the Live Lab project team across all three authorities
- **Local – Consortium:** pulling together M&E information at a theme level for the Corridor and Place-Based Decarbonisation Consortium
- **National Programme:** commissioned by the DfT through ADEPT, and the appointment of a supplier (hereon referred to as the 'DfT Supplier').

The approach adopted for this Live Lab will mesh the national and local M&E activities in a framework to achieve the seamless delivery of robust, consistent and transparent performance data. It is anticipated approximately two-thirds of M&E activity will be undertaken by the DfT Supplier and one-third at a local level.

At the local Live Lab and Consortium levels the themes and aims of the M&E activity are:

- **Monitoring and reporting on performance:** Undertaken at quarterly intervals, aligned with the local governance structure, the annual local Waypoint assessment undertaken by FHRG plus the national reporting and funding stage gate mechanisms for ADEPT
- **Demonstrating value for money:** utilising both the DfT Supplier and the Proving Services value for money assessment frameworks
- **Sharing, learning & disseminating:** Providing a robust way of gathering learning from the Live Lab and supporting a consistent approach to disseminating it locally and nationally, linking the M&E activities with the Comms Plan (detailed in the Sharing and Dissemination section). Focusing on transferability
- **Delivery of innovations and scalable results:** providing reassurance the Live Lab is developing innovations and producing scalable results (as set out in the Strategic Case)
- **Highlighting synergies:** supporting the identification of opportunities for collaboration by highlighting synergies locally and nationally
- **Addressing issues & risks:** Flagging areas where performance against targets may not be meeting expectations, identifying remedial actions and prioritising where improvements can be made (assessed alongside the local risk register, as detailed in the Management Case).

These local themes and aims will map across to the national level M&E evaluations set out in the M&E Scope tendered by the DfT/ADEPT. These evaluations are summarised below:

- **Impact evaluation** to measure the outcomes of each of the seven Live Labs and the programme as a whole. This will determine whether Live Labs have delivered their objectives and the extent to which their approach can be successfully scaled up. It will also measure the success of the Live Labs 2 programme in achieving a move towards decarbonisation across the roads infrastructure sector
- **Process evaluation** to examine how the Live Labs operated, what helped and hindered them in achieving their aims and how effective the Live Labs 2 programme model was in supporting the adoption of innovation in the roads sector
- **Value for money evaluation** to assess the costs and benefits of each Live Lab and whether they present an effective use of resources.

9.2. Methodology – measuring performance and impacts at a Live Lab and Consortium level

To illustrate the mapping of the local and national M&E activities, around measuring and reporting on performance and impacts, a summary is included in Table 9a.

Table 9a			
Interwoven levels of M&E <i>< < < supporting and informing across the levels > > ></i>			
M&E themes	Local Live Lab M&E activities	Consortium (theme) activities	Programme-level M&E evaluations*
Monitoring & reporting	Project governance (monthly highlight & exception reporting) and local KPIs Quarterly reporting on performance against the Theory of Change and Practice of Change (Project teams and Project Board) FHRG Carbon Analyser results and annual Waypoint assessments & final statement	Consortium governance (quarterly Exception and Progress Reports to Consortium Board)	Impact evaluation
Value for Money (VfM)	Linking to the VfM assessment (Value Analyser) already carried out by Proving Services and conducting annual Corridor reviews. FHRG Carbon Assurance Process and Analyser results	Benchmarking	VfM evaluation
Sharing, learning & disseminating (comms)	Monitoring the Comms Plan Customer satisfaction surveys	Learning Circle surveys	Process evaluation
Delivery of innovations and scalable results	Applying metrics to the Doughnut Economics model for wider social and environmental assessment	Benchmarking	Impact evaluation Process evaluation
Highlighting synergies	Comms Plan monitoring	Consortium governance reviews Joint Lessons Learned reviews	Process evaluation
Issues & risks	Risk management and reporting on risk register	Consortium governance – risk management	Impact evaluation

9.3. Methodology – Doughnut Economics & M&E

Our approach will be underpinned by the Doughnut Economics Model, a framework that balances environmental and social needs to ensure wider impacts are understood. This is to ensure that decarbonisation decisions are taken in the round, with other impacts (as detailed further in the Strategic Case).

Work undertaken by the Live Lab will develop a 'portrait of place', using the model. This will involve investigating past and current work applicable to the social and environmental factors within the model. The means of measuring and monitoring each of these elements will be explored to enable metrics to be applied. Any gaps in data will be identified for further investigation. In this way an innovative and experimental dashboard will be formed. We propose this dashboard will form part of the local M&E reporting and monitoring bringing together decarbonisation with wider social and environmental monitoring of both intended and unintended consequences.

9.4. Overview of Local Data Collection Supporting M&E at all levels

We will collect a range of data on our Net Zero Corridors to support the M&E of the project. The types of data that we will collect for this project include:

- **Carbon footprint:** To demonstrate that the project successfully reduces carbon emissions, we will implement a comprehensive carbon accounting process, supported by the partner FHRG, as stated in the Carbon Case
- **Asset data:** We will measure the impact decarbonisation has on the highway asset performance, particularly where we have used an innovative material or new maintenance approach. This may include Scanner, Coarse Visual Inspection (CVI), routine safety inspections, defect history, photographs and SCRIM. Where extra information is required, we will also conduct deflectograph surveys We will review the BAU condition monitoring processes already put in place by the authorities and may amend these to reduce the carbon emissions associated with the survey processes, or to collect bespoke data related to the long-term performance of particular treatments
- **Public satisfaction:** The perception of our corridors will be assessed through the M&E of complaints/compliments and surveys. We will use the Doughnut Economics Model, to balance social needs alongside environmental and economic factors when making decisions. Public satisfaction data will highlight any social issues caused by decarbonisation in the corridors
- **Cost:** To enable our project to be replicated and scaled up, we will collect data on the financial impact of decarbonisation
- **Operational data:** We will collect details of the required change to operational delivery, including time on site, type of traffic management required, whether works can be delivered at day or night, and the level of resources needed
- **Culture change:** We will conduct a baseline survey at the start of the project, followed by annual monitoring and evaluation surveys, of our project teams (both local authority and term contractor) to assess changes in behaviour, particularly whether carbon is more prominent in decision making.

We will have a common approach to collecting data across all corridors and the three local authorities (for example the Annual Engineers Survey for asset data) to enable comparability.

For all forms of data, we will collect data prior to the start of the project to set a benchmark. We will then continuously collect data for M&E to assess how outcomes change over the project (both in the initial three-year duration and the five-year tail).

We will use the information to refine our approach and drive alternative ways of working. For example, we can introduce drainage monitoring (either by measuring gully contents after cleansing, or by using sensors). If this data showed that drainage interventions could be reduced, we could reduce the number of visits to site and therefore carbon emissions. In another example, we could use localised weather sensors to drive efficiency in winter maintenance.

9.5. M&E outputs – sharing and maximising the benefits

For the Live Lab to generate the maximum benefit at local, national and global scales it will be important to deliver and share the results from M&E activities. To facilitate this the local M&E activities will align with the timeline set out in the tendered DfT M&E Scope. We will work with the DfT Supplier to develop shared milestones and deliverables, as proposed in Table 9b.

Table 9b		
< < < Sharing results and outputs > > >		
DfT Supplier's deliverables *	Local activity linked to timeline for reporting and deliverables	Shared local and national timeline of deliverables and reporting *
Inception & work programme	Collaboratively work with the DfT Supplier to establish the factor sets for M&E evaluations of the Live Lab. Invite the DfT Supplier to local workshops combining the M&E design with the development of local KPIs Explore local extension of the FHRG Value Analyser and existing VfM assessments	Within 3 months of contract commencement
Evaluation scoping and framework design		
Baseline data collection & report	<i>Provide the data & support required through:</i> Project management documentation (including the risk and issues register) Carbon Assurance Process evaluations and Carbon Analyser results Ongoing asset data collection for corridors Quarterly Comms Plan reviews	6 months after contract commencement
Regular M&E Dashboard reporting	<i>Provide the data & support required through:</i> Local governance structure reporting mechanisms in place from Day 1 Explore linking the dashboard to the Doughnut Economics model to be developed for the Live Lab	To begin 6 months after contract commencement, to be updated regularly
Community sharing seminars	Link the national seminars to the local programme of Learning Circle activity and annual local event	To be held on a regular basis (annually at a minimum)
Annual Delivery Progress Reports	Link to the timing of the annual local Waypoint assessment	April 2024 and 2025
Post Delivery Evaluation Report	Link to the timing of the FHRG final statement	July 2026
Legacy Reports	<i>Project closed, but may link to ongoing 'spin-off projects'</i>	March 2027 and March 2028
Legacy Gateway Review	<i>Project closed, but may link to ongoing 'spin-off projects'</i>	January 2028

9.6. Integrating national M&E evaluations with local activities

The DfT Supplier's three evaluations (impact, process and value for money) are set out in the following sections, alongside details of how each will be supported locally.

M&E Impact Evaluation: The DfT Supplier's Impact evaluation will involve an objective test of what changes have occurred because of the Live Lab, the extent of those changes, an assessment of whether they can be attributed to an intervention and a comparison of benefits to costs. It will look at intended and unintended effects of outputs, as well as how well objectives are achieved.

We will work with the Supplier to develop their understanding of the project, the outputs and intended outcomes and how these will be measured. We will support them in scoping out an impact evaluation approach in the first three months of the Supplier's work and support their evaluation throughout the delivery phase. In addition, we will explore with the supplier the consideration of common approaches to monitoring and evaluation across the Consortium.

It is noted from the Scope the Supplier will propose impact measurements that are Specific, Measurable, Attainable, Relevant, and Time-Bound (SMART), where possible, and underpinning these metrics will be the Theory of Change (ToC) developed for the project. Exeter University, as a partner in the Live Lab, is developing the ToC into a 'practice of change' and will collaborate with the Supplier on the development of the related measurements. Further details on the ToC are set out in the Strategic Case.

Local M&E work through the carbon assessment undertaken by FHRG using the framework and Carbon Analyser tool (detailed in the Carbon Case). For example, an initial mapping exercise on existing data, data gaps, sources and means of access will be carried out during mobilisation as part of the FHRG-led series of workshops.

As the programme objective is driving down indirect carbon attributable to infrastructure, it is noted the Supplier is required to set out a robust and clear approach on how this will be measured, alongside the expected risks and how they will be mitigated. A risk register has already been developed for the Live Lab (included in the Management Case) and we will liaise with the Supplier to ensure risks identified as part of the M&E works are incorporated.

M&E Process Evaluation: At the national level the DfT Supplier's process evaluation will seek to identify and share findings iteratively as the programme develops by monitoring the successful delivery of outputs, sharing lessons learnt between projects and being an active part of the communications critical to wider adoption and legacy.

Lessons learned will be collated and logged locally as part of the management of the project and it is proposed this information forms part of the Process Evaluation. We will provide further support by monitoring comms activities based on the Live Lab Comms Plan (separately submitted to ADEPT), and summarised in the section on Sharing, Dissemination and Working. Additionally, local monitoring and reviewing of customer satisfaction will be undertaken. This will focus on the Corridors, and link to the surveys and engagement work carried out as part of works delivery.

Value for Money (VfM) Evaluation: It is understood from the national M&E scope that the VfM evaluation will demonstrate and quantify the outcomes of the Live Lab, comparing the costs and benefits achieved through the programme against the original expectations. The DfT Supplier will undertake a cost-benefit analysis of each of the Live Labs which aligns with the outputs and impacts identified in the impact evaluation, and where possible taking account of counterfactual analysis. We propose integrating this with a local approach to evaluating VfM. We will explore linking local authority-based FHRG VfM assessment results to the DfT Supplier's VfM evaluation. The aim will be to develop a proportionate Corridor-based local VfM assessment for annual evaluation and reporting. Further details on our approach to VfM are contained in the Economic Case.

10. Sharing, Dissemination and Working

We will proactively support ADEPT's strategic programme-level communications by openly sharing knowledge both inside and outside the highways sector. Our approach to comms focuses on the Live Lab role as 'content creator', with ADEPT's central role focusing on identifying and utilising the channels to reach target audiences. It meshes ADEPT's activity with local communications and engagement activity, and the work of the Live Lab's partners.

A comprehensive, bespoke Wessex Live Lab Communications Plan has been produced and submitted to ADEPT alongside this Business Case. This section is to be read in conjunction with the Plan, and provides supplementary information, aligned with ADEPT's Business Case guidance.

10.1. Proposal for Continual Sharing and Dissemination

Sharing, dissemination and working - with other local highways authorities: We will provide ADEPT with the information required to facilitate sharing knowledge through blogs, articles and white papers, media and social media content, webinars, content in magazines (e.g. Highways Magazine), and videos/images. We will also support the preparation and submission of papers that ADEPT require for conferences/exhibitions such as:

- ADEPT-led events such as Live Lab Expo and Traffex (starting June 2023)
- Regional alliances including the South West Highways Alliance and South East Seven
- National roads organisations including the Local Councils Road Innovation Group, and FHRG
- Local authority bodies such as Solace, the Local Government Association (LGA) and Chartered Institute of Public Finance and Accountancy (CIPFA)
- Institutes including ICE, CIHT and IHE – we are represented on CIHT's Learned Society and Technical Strategy Board where learning can be embedded in policy and industry guidance.

In addition, our partner, FHRG, will conduct Round Table sessions with FHRG members (covering 40 local authorities).

Sharing, dissemination and working - with the wider highways sector: For strategic road bodies (e.g. National Highways, Traffic Wales and Transport Scotland) and Local Enterprise Partnerships, we will provide ADEPT with the information required and also communicate through local BAU engagement at meetings and with regional contacts. Additionally, existing comms relations with sector-based journals and publications will be utilised at a local Live Lab level. For example, this has already led to discussion about a potential programme of regular pull-out articles in Highways magazine, culminating in an annual brochure-style collection that can be used as annual progress reports, demonstrating what was done, achieved and the lessons learnt.

Sharing, dissemination and working - with the UK public sector beyond roads: we will support ADEPT by providing content to be shared beyond the sector, and through:

- Local authorities: sharing through BAU engagement with local authority organisations such as Solace, the LGA and CIPFA
- Private sector: we have links outside the roads sector which will enable knowledge sharing.
- Academic/research partners: our partners Circle Economy and University of Exeter already work across multiple sectors.

Sharing, dissemination and working with UK industry: Contractor partners will share information through industry bodies such as the Construction Industry Council, Asphalt Industry Alliance, Road Surface Treatments Association and Mineral Products Association.

Sharing, dissemination and working with international audiences: Our project partners have existing global links to share knowledge. DEAL and Circle Economy promote Doughnut Economics globally (such as in Amsterdam). Colas, as part of an international group, also has established worldwide relationships. Partners will additionally share knowledge by submitting papers to international organisations including PIARC and the InterGovernmental Panel on Climate Change.

Sharing, dissemination and working - with local communities and stakeholders: At a local level community and stakeholder engagement will be key. For work on the Corridors the BAU comms activity will continue, supplemented by additional comms linked to the Live Lab. To develop comms that generates local understanding and interest in carbon reduction, the environment and impact of work on the highway input from local focus groups will be sought. For example, the Local Community Networks in Somerset and Cornwall will provide an ideal testbed for the development of comms. Unique ways of conveying comms messages will be explored.

Further details of this local engagement, stakeholders and key messages are contained in the Communications Plan.

10.2. Meshing local and strategic programme-level comms including the use of local expertise

In addition to the integration and meshing of comms activities included in the previous paragraphs the intention is to explore with ADEPT the provision of a public web-presence through a central Live Labs website, to provide a channel to promote and mesh local, national and global activities.

10.3. Statement of commitment to the collaborative, open and sharing spirit of Live Labs2

We recognise the critical importance of collaboration and will embrace and embed the open and sharing spirit of Live Labs 2 throughout the project and beyond. This approach is demonstrated through, and enhanced by:

- **Weekly Consortium Team Meetings:** Bringing together all partners through informal, drop-in virtual sessions to share news, views and embed collaboration
- **Shared Hubs:** An online Consortium working platform is already facilitating joint working (at both Consortium and individual Live Labs levels) through shared documents, libraries and messaging. We will be an active member on ADEPT's Live Labs SharePoint site
- **'Learning Circle':** open to like-minded partners (including 'Fast Follower' Live Labs authorities) from outside the consortium, with membership to grow over the project. Engaged in a two-way exchange of knowledge, bringing in new ways of working to be trialled in our corridors and feeding back outcomes to support members' own decarbonisation journeys
- **ADEPT Comms Meetings & Consortium Comms Leads Meetings:** being proactive members of the fortnightly stand-up meetings discussing what has been achieved, ideas and challenges. Additionally, bringing together the leads from the five authorities within the Consortium, and now involving Coast as ADEPT's comms and PR supplier, to provide a forum for collaboration
- **Community Sharing Seminars** – participating in the programme of seminars led by the DfT M&E Supplier
- **Annual Conference:** Presenting progress and feedback on the Live Lab
- **Joint 'Innovator days':** Proactively seeking and supporting the innovation required for the delivery of the Live Lab, with an open call to local suppliers to join Innovator Days to share and present potential innovations.