

# Greenprint

## Outline Business Case: post submission update

**South Gloucestershire Council  
West Sussex County Council**

**31/05/2023**

A carbon negative systems model for green infrastructure management



## Document Control Sheet

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## Elevator Pitch

Greenprint is a carbon-negative systems model for green infrastructure management. It aims to reduce operational emissions and revolutionise the narrative for biomass drawn from councils' estates from 'waste' to 'value'.

The partnership will pioneer replicable, circular economy approaches for collecting verge biomass that will reduce the costs and emissions associated with ongoing management, whilst increasing biodiversity. Collected biomass will be processed to generate new sources of clean heat and power, alternative fuels and asphalt additives that will further reduce the cost and emissions from highways operations.

This 'Greenprint' will demonstrate a sustainable and replicable model for local authorities, transforming the role and value of the highways green asset, and enable highways, waste and other service functions to work together in synergy to deliver financial, environmental and social value benefits while reducing carbon emissions.

This Outline Business Case (OBC) is in support of the Expression of Interest (EOI) and the ADEPT Live Labs 2 (LL2) process.



### **Nigel Riglar, Executive Director – Place**

“I am passionate about the importance of partnership work to catalyse, harness and drive forward innovation to achieve Net Zero and I am excited by what we can achieve together through this project to contribute to the Net Zero transformation of highways management across the UK. “

### **Matt Davey, Assistant Director – Highways, Transport and Planning**

“By working with South Gloucestershire and experts in the field, this Live Labs project will help us continue at pace with progress we have made thus far. By transforming our operations, we have the opportunity to decarbonise our green estate and maximise the value of green waste to bring tangible reductions in CO2 and fugitive emissions.”

### **Councillor Toby Savage, Council Leader and Climate Emergency Portfolio lead**

“By South Gloucestershire Council and West Sussex County Council bringing together and harnessing our collective expertise, experience, and passion, I am excited about what we will achieve through working together through Live Labs 2 to drive forward and share innovation.”

### **Deborah Urquhart, Cabinet Member for Environment and Climate Change (and Deputy Leader)**

“Along with South Gloucestershire Council, we are committed to leading the way in the decarbonisation of green asset management. I very much support this Live Labs opportunity to explore and share best practice with other authorities.”



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## Post Commissioning Board update

The following tables have been added in response to questions raised by the SOBC Commissioning Board.

- Table 1a: Details of partners and proposed roles
- Table 1b: Proposed structure for M&E programme
- Table 1c: Linkages within Theory of change

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## 1. Project Overview (2 sides of A4)

### **The Problem:**

Typically, decarbonisation in Local Highways maintenance has focused on blacktop services, and how the individual elements and processes relating to highway maintenance can be optimised to reduce greenhouse gas emissions. There has been a siloed approach, and a lack of systems thinking across not only the wider set of highways services, such as green estate management, but also the wider landscape of local authority operation and functions. With this siloed approach, new opportunities in data analytics, carbon modelling, biofuels and modern waste treatment functions are being missed. By linking with other council services in a systems approach, highways can be viewed holistically. This includes the need to deliver innovation and reduce carbon emissions by reimagining the green highways estate and biomass as a resource linked with wider council operations and functions. The decarbonisation of highways demands a deep re-evaluation of how the sector makes decisions, delivers and re-frames existing practices and processes and test and optimise new tech and innovation.

### **The Project:**

South Gloucestershire Council (SGC) and West Sussex County Council (WSSCC) propose the development of a 'Greenprint', a reimagined green estate management model, integrated within a wider carbon management system. The Greenprint will set out a replicable and sustainable methodology for the delivery of zero carbon green asset management, including operations, intra-authority system approaches and outputs from circular economy trials and research.

The project will trial end-to-end circular economy methods designed to transform how to re-use raw materials from green assets. Throughout the project there will be measuring of carbon to calculate outcomes from the trials, and a data-driven model for carbon emissions will be designed to support intelligent decision making across green estate in local highways authorities (LHAs).

Currently, the baseline approach to verge management is to cut the green estate and leave the cuttings to accumulate, forming a layer on top which increases the soil nutrient levels leading to the proliferation of robust grasses and other nutrient-demanding vegetation. Therefore, 'cut and leave' does not encourage biodiversity, requires more frequent mowing and generates more operational emissions. Building on existing work, SGC and WSSCC will test new technologies for cutting and collecting from their green estate, including their road verges. The approach of 'cut and collect' reduces the number of times that the verges need to be cut over time, which reduces operational emissions, increases biodiversity, increases soil carbon sequestration, and will reduce the overall cost of verge maintenance. The processing of the cuttings, known as biomass, presents the next phase of the whole life cycle view of the green estate management model, shown in Figure 1. SGC and WSSCC will trial different processes, with a view to understand and recommend the processing options based on different operational contexts.



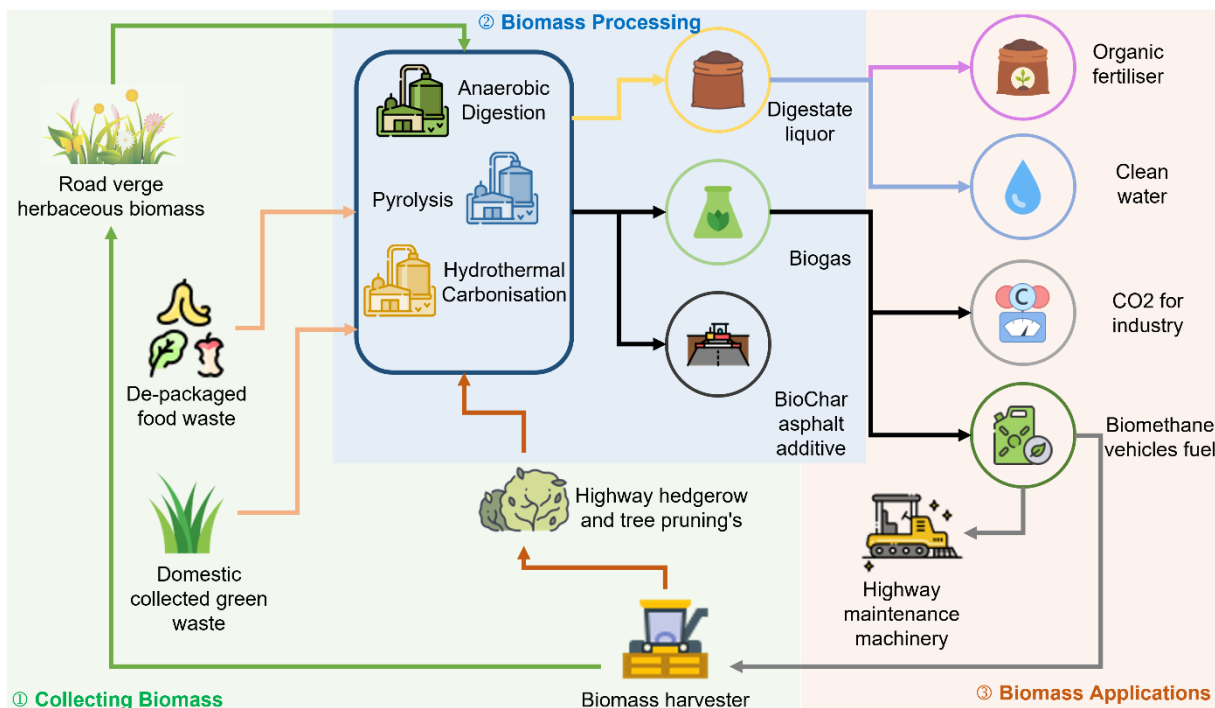


Figure 1: Greenprint green estate model

SGC plans to comingle the grass cuttings with food waste using their current waste contractor who will transfer it to a large-scale anaerobic digestion (AD) plant. AD involves a process that breaks down organic materials like biomass and food in the absence of oxygen, into biogas and a nutrient-rich digestate which can be used for fertiliser. The project will investigate options and considerations to test, develop and establish operational arrangements, with the aim of formalising an ongoing agreement between SGC and the plant owners.

WSCC plans to work alongside academic and industry partners to test innovative approaches to small-scale biomass processing. WSCC will hire specialist small scale technology to run AD and hydrothermal carbonisation (HTC) trials. HTC is a process that converts organic matter into a coal-like substance through exposure to high temperature and pressure in the presence of water, creating biogas and a solid material called hydrochar. Through Greenprint, WSCC will also be supporting an existing pyrolysis research project. Pyrolysis involves heating organic materials to a high temperature in the absence of oxygen. This causes materials to break down into simpler molecules, and outputting biochar and bio-oil which can be used for highway materials and for fuel respectively.

The outputs of the biomass processes can be used in a range of new and emerging applications which will be explored by the project, along with potential links with other LL2 projects. This includes biomethane for use as fuel, alongside other outputs for agriculture and highway materials. Biochar-modified asphalt binder as an additive into asphalt production has consistently demonstrated a 35% increase in deformation resistance within a laboratory and operational context (Ma, 2022). The key now, is to create an operational mechanism for LHAs to operationalise their own biomass outputs.



## 2. The Strategic Case (10 sides of A4)

### 2.1. Approach

The DfT’s and ADEPT’s guidance document ‘Outline Business Case (OBC) Guidance v1’, outlines the criteria that should be covered as part of the Strategic Case for LL2. Table 1 shows where the relevant information, in accordance with the requirements can be found in subsequent sections.

Content	ADEPT & DfT Requirements	OBC section
<b>Live Labs Vision</b>	How your proposal meets LL2 Vision and Principles	2.2
<b>Policies &amp; Strategies</b>	How it meets national, sub-national and local policies and strategies	2.3
<b>Future Challenges</b>	How it addresses future challenges not covered above	2.4
<b>Partners</b>	Confirmation of partners, roles and any funding sources / leverage	2.5
<b>Drivers for Change</b>	A description of the drivers for change	2.6
<b>Location Maps</b>	Details of process / locational maps where appropriate	2.9
<b>Theory of Change</b>	Detailed theory of change / logic map for your proposal	2.10
<b>Impacts</b>	Details of how you will measure impacts and how these link with M&E activities	2.8, 9.2

Table 1: ADEPT & DfT requirements for the Strategic Case

### 2.2. How your proposal meets LL2 Vision and Principles

The UK faces a significant challenge to decarbonise across all sectors to achieve the target of net zero greenhouse gas emissions by 2050. The transport sector is the largest source of greenhouse gas emissions in the UK, being responsible for over a quarter of emissions (MP, 2022). Innovation, research and development are necessary to ensure new ideas and solutions are available to meet this challenge. This will unlock new green technologies, cut the overall cost of decarbonisation, deliver system level efficiencies, and help deliver the social and behavioural transformation required.

LL2 vision is: *‘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. (ADEPT, 2022)*

SGC and WSCC have developed a project that delivers carbon reduction; and through a whole system integrated model, delivers wider objectives including significantly improving biodiversity. SGC and WSCC propose the development of a re-imagined highways green estate management ‘Greenprint’. Through application of a data-driven carbon systems model, and the trialling of end-to-end circular economy methods, the project will transform how SGC and WSCC use and value the green infrastructure highways asset. Greenprint will optimise innovation through integrated work across council functions to deliver emissions, carbon sequestration, cost, biodiversity and wider benefits.

The LL2 principles underpin Greenprint’s objectives to provide a framework for replication across the UK and elsewhere. SGC and WSCC have grouped these into 5 core areas with an additional benefit to increase biodiversity. Greenprint will aim to:

- Achieve [net zero](#)
- Ensure an integrated ‘ecosystem approach’, knowledge sharing and [scalability](#)
- Deliver [financial](#) savings
- [Collaborate](#) across the sector
- Ensure [customer satisfaction](#)
- Increase [biodiversity](#)





## Net Zero

With a laser sharp focus on carbon reduction, 'Greenprint' will deliver a replicable system-model for green estate management that removes more carbon than it releases. This system approach ultimately seeks to revolutionise highway maintenance BAU to be net zero and future ready. This will be achieved by placing carbon at the heart of decision making and harnessing verge biomass within a zero-carbon highway and wider system. Building on existing best practice and sector leading research, Greenprint will apply new technology, tools and innovation to test, innovate and disseminate new ways of working for others to follow.

Greenprint will deliver optimisations at a strategic, system and service operations level, to reduce carbon emissions and costs, and optimise service efficiency. The project will deliver wider system benefits to current and future challenges for local highway maintenance including resilience to the changing climate, to inspire and enable a net zero carbon and future ready highways sector. SGC and WSCC anticipate several demonstrable carbon savings through the project. These include:

- **Carbon Reduction in Maintenance activities:** reduction and optimisation of mowing cycles and use of sector leading operational equipment and machinery will reduce scope 2 and 3 emissions from green estate management.
- **Reduction in Biogenic Emissions:** through the adoption of methods designed to collect and make use of the arisings the project will reduce biogenic emissions released when arisings are left to break down on site.
- **Biofuel generation:** production of biogas and biomethane from AD created from green estate biomass which will be used to replace fossil fuels
- **Asphalt additive:** biochar-modified asphalt binder that can be generated from the project can be used as an additive for asphalt production to increase material resilience and reduce the maintenance requirements by increasing durability.
- **Carbon sequestration** – changing management of the highway verge to 'cut and collect' will increase the amount of carbon locked into the soil (sequestration)

As part of the three-year funded programme, SGC and WSCC will monitor and evaluate the project to track the carbon reductions above and ensure that the process of monitoring and evaluation can be taken forward as BAU to support both councils in achieving their own strategic objectives and the 5-year LL2 monitoring stage.

## Scalability

Typically, decarbonisation in LHM has focused on blacktop services, and how the individual elements and processes relating to highway maintenance can be individually optimised for the carbon lifecycle. This siloed approach, and a lack of systems thinking has missed the opportunity to look more broadly across not only the wider set of highways services, such as green estate management, but also across the wider landscape of local authority operation and functions. With this siloed approach, new opportunities in data analytics, carbon modelling, biofuels and waste treatment innovation are being missed. By linking with other council services in a systems approach, the project can view highways holistically. This includes reimagining the green highways estate and biomass as a resource which has value linked with wider council operations and functions. The decarbonisation of highways demands a deep re-evaluation of how our sector make decisions, deliver and to re-frame existing practices and processes.

A key objective of 'Greenprint' is to test approaches to design and scale a system 'green print', a toolkit that provides a replicable zero carbon green infrastructure management model. This will provide local authorities both in the UK and internationally with a guide to implementing this approach in their own context. SGC and WSCC recognise that knowledge sharing is critical to the success and scalability of the Live-Labs programme. Project partners will work proactively to share learnings and 'Greenprint' outputs of the project with regional and national networks including Western Gateway, LGTAG, ADEPT and wider networks. Project Partners include Plantlife International, whose 'Road Verge Guide' was instrumental in inspiring the work of both SGC and WSCC. The national Plantlife Road Verges Advisor will play a key role in supporting both development and



sharing of the Greenprint through their role working with LHAs across the UK to change highway verge management.

## Financial

There are many reasons why decarbonisation innovations in the sector are not accelerating as quickly as the sector need them to. This includes the unprecedented financial pressures that local authorities face, alongside the need for access to tested, best practice information to deliver operational cost and carbon savings over time. Whilst LL2 gives the sector an opportunity to test new ways of decarbonising the sector it is also key that Live Labs projects are financially viable to be replicated across the country and internationally. Greenprint supports the financial principles of LL2 by:

- **Reducing operational cost of verge management** will make revenue savings for both local authorities by reducing the number of cuts. Whilst this may not be realised within the first year of the project, Greenprint will demonstrate a pathway to operational savings by the end of the project.
- During the first phase of the project the focus will be on verge management. Once this phase is complete and SGC and WSCC are scaling the quantity of grass cutting being used by the AD plant the project will look at the **financial opportunities and benefits of the biomass applications** for use within both local authorities and other Live Lab projects.
- The principle of Greenprint is to develop a replicable and sustainable methodology for the delivery of green asset management, comprising operations, latest tech, intra-authority system approaches and outputs from the circular economy trials. This will **save revenue budgets across the UK and prevent the innovation costs** normally associated when trialling a new process or technology.

## Collaboration

Cross sector decarbonisation is inherently challenging, and requires the collaboration of historically competing teams, priorities, and partners. Greenprint recognised early in project development that active private sector and academic collaboration would be a critical element of the live labs projects ensuring Greenprint are able to build on latest leading research, break down barriers and work collaboratively for the benefit of the sector.

A key principle within the LL2 programme is the ability to demonstrate the benefits of true partnership across the sector including with other local authorities, the private sector and research and academic sectors. Greenprint has been developed through significant collaboration between a core group of partners.

Collaboration across private, public and academic bodies is a key principle of the LL2 programme. Whilst there has been a core group of partners involved in the development of Greenprint SGC and WSCC have also identified several partners who will add significant value to the project and extend its ability to create an open and interoperable innovation ecosystem.



Figure 2: Greenprint founding partners



Figure 3: Greenprint wider partnerships



## Customer Satisfaction

Greenprint is a project that extends beyond engagement with those working in the highway sector and involves significant engagement with other services such as waste, energy, planning and local communities including Town and Parish Councils. The management of the green estate for all local authorities is complex and can be emotive for local communities. Engagement with local communities and work with the partner Plantlife who lead the national 'No Mow May' campaign, is a key element of the Greenprint Communications Plan. Effective engagement and communications is essential to ensure stakeholders understand the value of the project in terms of the local benefits they will see in communities including benefits to health and wellbeing as well as from a strategic level to meet the council's decarbonisation targets.

A key element of customer satisfaction includes an element of behavioural change, which has also been identified by the ADEPT Live Labs team and nationally has been championed by Greenprint partner Plantlife through their work with councils including SGC and WSCC, and the sector leading Plantlife 'Road Verge Guide'. Greenprint has identified two key behavioural change projects:

- **Behavioural Change Internal** – Internal teams within local authorities typically have a limited understanding of the benefits of changing the way the green infrastructure is managed. To ensure a successful project the strategic objectives and aims will be clearly presented to internal teams at all levels from maintenance operatives to decision makers, to ensure the project success and enduring sustainability/legacy
- **Behavioural Change External** – Greenprint will aim to inform and inspire local communities to think about green assets in their communities differently. This includes the social, environmental and health benefits of improved biodiversity whilst reducing carbon emissions and increasing carbon sequestration.

## Biodiversity

Whilst improving biodiversity has not been identified as a core principle of the LL2 programme 'Greenprint' has identified the significant opportunity for a 'win win' improvement in biodiversity that can be made. The key partnerships SGC and WSCC have made will ensure that through intelligent verge maintenance and the use of cut and collect methodologies Greenprint will radically improve biodiversity. Plantlife International are a key innovation partner in the team. Building on the success of the Plantlife [Good Verge Guide](#) which has inspired change to highway verge management across the UK, the Plantlife ambition is for least half of the UK's road verges to be managed as species-rich grassland.

## 2.3. How it meets national, sub-national and local policies and strategies

### 1. Net Zero Strategy: Build Back Greener

The Net Zero Strategy, published in October 2021, sets out the vision for transitioning to a net zero economy and outlines the path to achieve the 2050 commitment. Within the strategy low carbon fuel supply is a core objective for reducing emissions across the economy. To accelerate the development of UK plants to produce advanced fuels, government has launched grant funding through schemes including the Future Fuels for Flight and Freight Competition and Advanced Biofuels Demonstration Competition. The learnings from the Greenprint project can be used to support and enhance other funds and learning can be shared.

### 2. Clean Growth Strategy 2017

Clean growth means growing the national income while cutting greenhouse gas emissions. Achieving this is at the heart of the UK's Industrial Strategy and will increase productivity, create jobs and help protect the environment upon which future generations depend. This strategy states that the average greenhouse gas savings from use of biofuels are around 70 per cent compared to petrol and diesel and that there is an urgent need to accelerate and scale up innovation through adopting new green technologies alongside a whole system and whole life cycle approach to tracking and



reducing carbon emissions. The learnings from Greenprint will support this strategy and can be shared to aid further development and understanding.

### 3. Decarbonising Transport A Better, Greener Britain, 2021

This strategy sets out how the government is going to achieve its ambitions to decarbonise our transport sector and deliver the carbon emissions reductions required. Whilst there are many ambitions outlined in the document our proposed LL2 projects specifically support the following commitments:



A zero-emission fleet of cars, vans, motorcycles, and scooters



Delivering decarbonisation through places



Maximising the benefits of sustainable low carbon fuels



Supporting UK research and development as a decarbonisation enabler

Greenprint through leading innovation in highways green estate management will highlight the role of highway verges as a carbon store, a source of biogenic materials which reduces operational emissions.

### 4. Climate Change Committee 2022 Progress Report

This report from the Climate Change Committee to Parliament is an assessment of the Government's performance in combatting climate change. Within the report is a summary of the range of actions and conditions that combine to enable decarbonisation of surface transport and how this works together to deliver the sector's decarbonisation pathway. A key enabler highlighted within this is the use of biofuels. It is crucial that the learnings are shared with others so that Greenprint can scale the use of biomass across the UK and internationally.

### 5. Environment Act 2022

Requirements to deliver Biodiversity Net Gain and to produce 'Local Nature Recovery Strategies' come into force at the end of 2023. Highway verges play a key role in linking and connecting habitat for nature and Greenprint will support and inform the changes needed across the sector to value and optimise the role of verges and good management practice aligned with new requirements.

### 6. Climate Change Risk Assessment and National Adaptation Plan

The UK Government Climate Change Risk Assessment highlights that 'We must prepare for a potential 4 degree rise in temperature by the end of the century'. This requires transformation in how the project plans, designs, manages and uses infrastructure to optimise adaptation and resilience. Greenprint will play a key role in driving this work forward through optimising the role of the green estate.

## Local Polices and Strategies

This Live Lab builds on ambitious commitments and innovation programmes both councils have adopted during recent years. In response to the Climate and Nature Emergency, both SGC and WSCC set commitments in 2019 to achieve net zero carbon emissions by 2030 and have strategies and action plans which set out priority action to achieve this including overarching commitments set out in their Council Plans. Both SGC and WSCC have Climate Change Boards which oversee implementation and tracking of progress, including actions to decarbonise highways operations. SGC is leading implementation of a climate and nature decision wheel for all work and projects across the council to embed Net Zero at the heart of decision making. WSCC have a Climate Action Plan for Highways, Transport and Planning to i) measure and reduce whole life carbon of highways schemes, ii) develop and deliver internal comms strategy, iii) secure the transition to an ultra-low emissions school's fleet, maximise the integration of natural capital solutions, and iv) prioritise resources to help communities reduce their CO2 emissions.



Regionally, SGC is part of the West of England Combined Authority area and the Western Gateway region which also have net zero emissions commitments and work which Greenprint will support. Greenprint builds on verge management trials by both authorities. SGC has been trialling changes to management over the last 3 years and WSCC is currently two years into a cut and collect trial in partnership with the South Downs National Park Authority (SDNPA).

## 2.4. How it addresses future challenges not covered above

Whilst the project is focused on existing challenges faced by the transport sector, the project also wants to ensure it can respond to future challenges. These include:

- The role of Green Blue Infrastructure (GBI)

“GBI plays an important role in promoting healthy and safe communities, as well as helping to deliver net zero targets, adapting to climate change, and conserving and enhancing the natural environment” ([CIHT Green and blue infrastructure: A transport sector perspective, 2023](#)). The CIHT have published a document looking at the value of GBI to the local communities and highlighting that while there is a wide range of general policy and guidance there is very little resource given to the street and road specific GBI. A recent IPPC report urged a focus on climate-resilient development so that the highway network can use GBI to support adaptation and resilience to the climate emergency. Optimising the role of GBI to provide Sustainable Drainage Systems (SuDS) to slow and hold the flow is crucial, and other benefits of GBI as highlighted in the governments Climate Change Risk Assessment 2022 (Government, UK Climate Change Risk, 2022) and National Adaptation Plan.

- Biodiversity

The 25 Year Environment Plan (25YEP) sets out the ambition to establish a Nature Recovery Network (NRN), recently reinforced in the Environmental Improvement Plan (EIP). The NRN is envisaged to include green/blue infrastructure (GBI) which will benefit society by delivering a wide range of ecosystem services. It is intended to expand, improve, and connect a national network of wildlife-rich places across cities, towns and countryside, protecting the historic natural environment and enhancing public access to nature and its enjoyment. Newly created and restored wildlife-rich habitats, corridors and stepping-stones will help wildlife populations to grow and move for resilience and biodiversity recovery.

The creation and enhancement of ecologically functional green infrastructure is now being driven by the nationwide delivery of Local Nature Recovery Strategies under the Environment Act 2022. This act also strengthens the duty public authorities in England now must conserve and enhance biodiversity under the Section 40 of the Natural Environment and Communities Act 2006 (revised). Further incentive is provided by the requirement for Biodiversity Gain as a condition of planning permission (Schedule 14) and in delivery of Nationally Significant Infrastructure Projects (NSIPs Schedule 15). Delivery of Biodiversity Gain is supported by Biodiversity Gain Site Registers and Biodiversity Credits which will provide land and funding respectively.

## 2.5. Confirmation of partners, roles and any funding sources / leverage

Following the acceptance of the SOBC, detailed discussions with partner organisations have started as part of project mobilisation. The table below expands on the list of partner organisations and describes their proposed roles.





Partners	Roles	Status
<b>Subject Matter Experts:</b>		
Plantlife International	<p>In the project governance, Plantlife International has a key role in the Research &amp; Innovation group in support of Work Package 5 "Environmental Impact". Plantlife will design, oversee and deliver the biodiversity survey and soil carbon sample work as a package, and will start this summer by developing/testing methodology and gathering baseline of initial sites. They will oversee the Digital Twin for verge management. Their involvement with the M&amp;E goes beyond 3 years of the implementation stage of the project to the 5 years evaluation stage to monitor progress and ensure we have embedded those new practices in the highways management BAU. Plantlife will work in close coordination with Cut &amp; Collect, Biomass technology and Carbon Model work packages.</p> <p>Plantlife as a founding and key strategic partner of the project will be part of the Greenprint project board (name of board tbc) to provide biodiversity check and challenge and support, and be part of the project technical group to provide tech expert input, support with prep of papers, blogs, comms, conference presentations and info sharing etc</p>	Early engagement completed. Procurement started
Peakhill Associates / Dr Nick Cheffins	<p>In the project governance, Peakhill Associates has a key role the Research &amp; Innovation group in support of Work Package 3 "Biomass Technology Innovation". Peakhill Associates will design, oversee, and deliver the small, and medium in lab and field trials for HTC/AD technology and in existing plant for large scaler. In addition, they will oversee the application of biochar and biofuels in various circular life tests and trials. Peakhill Associates will work in close coordination with Cut &amp; Collect, Environment Impact and Carbon Model work packages, to provide specialist technical support and advice across the project.</p>	Early engagement completed. Procurement started
<b>Innovation Strategy and Delivery:</b>		
SGC, WSCC	<p>We want to stress here the major role and collaboration between both councils and the internal resources of specialists they provide to make the project happen. A Memorandum of Understanding has been drafted which sets out how the 2 councils will work and make decisions together. SGC will act as the lead finance partner/accountable body for the project and an Accountable Body Agreement is being prepared regarding arrangements which will be finalised aligned with DfT grant conditions/requirements.</p>	Ongoing





Amey Consulting	<p>The role of Amey set out in the SOBC will evolve to deliver 3 different but linked work packages.</p> <p>1) WP4_Economic &amp; Benefits Realisation: Amey will develop a Greenprint Benefits Management Plan using the benefits management lifecycle and assign clear accountability for the benefits of the Live Lab to be realised and recorded. Amey have designed and embedded a Digital Lab service for National Highways to realise benefits of innovation initiatives. Amey have also managed the benefits realisation of Live Labs 1 for the Highways Data Platform in Kent.</p> <p>2) WP7_Whole Life Cycle Greenprint: Supporting the strategic analytics and outputs phases, this work package entails monitoring and evaluation across all Work Packages, providing comprehensive information on trial activities, including the project's Whole Life Cycle and constituent elements, their performance, and impacts, to record outputs that enable a thorough comprehension of proposal benefits and facilitate their optimal utilisation, while also documenting the methodologies, processes, lessons learnt and involvement of academics or suppliers associated with the trials. Outcomes: Greenprint System Model; Greenprint How-to; Greenprint Benefits Calculator.</p> <p>3) Project Elevation &amp; Wider Integration:</p> <ul style="list-style-type: none"> <li>• Supporting the LA Comms teams</li> <li>• Using Amey's network to elevate the project across local authorities and National Highways. This includes but are not limited to: <ul style="list-style-type: none"> <li>• Greenprint presenting at key industry events</li> <li>• Hosting Stands– i.e., LCRIG Innovation Festival</li> <li>• Support Horizons Scanning for: <ul style="list-style-type: none"> <li>• New Technologies</li> <li>• Existing projects to support</li> <li>• New Funding Streams</li> <li>• Facilitate integration with other Live Labs – North Lanarkshire</li> </ul> </li> </ul> </li> </ul> <p>*Amey will leverage this WP with match funding</p>	Procurement started
<b>Carbon Measurement:</b>		
Future Highways Research Group	Reference for the Carbon Model, we will work in collaboration to seek advice and provide feedback as we undertake research and improvements to our carbon model. To note that there are some aspects of carbon measurement in Greenprint that are out of scope of the FHRG tool which we are currently investigating with relevant partners.	Engagement started
<b>Supply chain/system partners:</b>		
Suez	Suez is the SGC waste collection and disposal contractor and is supporting the join up between food waste collection and verge biomass for AD	Existing contracts in place



Tarmac	Our project is embedded with Tarmac trials with char reinforcement in bituminous road construction and surfacing. Peakhill through the project are working with Tarmac on methodology and requirements to inform project design and delivery.	Early discussions started
GENeco	GENeco (a subsidiary of Wessex Water) runs an AD plant in Avonmouth which receives SGC food waste and with which verge biomass will be co-mingled through the project.	Existing contracts in place
Grasstex	Grasstex is the WSCC verges maintenance contractor and will be trialling and developing biomass collection in West Sussex.	Existing contracts in place
<b>Academic/Research:</b>		
University of Brighton	The details of the universities' support for this project are currently being defined. Their involvement is crucial for the advancement of the Carbon Model and Biodiversity twin model. However, the extent of their participation is contingent upon the specific components they can deliver and quotation we receive. By forging partnerships with both public and private sectors, we aspire to spearhead ground-breaking innovations.	Early discussions started
University of the West of England		
University of Leeds Engineering schools		

Table 1a: Details of partners and proposed roles

## Other Partners

**The Western Gateway:** Bringing together councils from South Wales and the West of England, and the South-West Highway Alliance will be engaged in the next phase of developing the project.

**South Gloucestershire Climate and Nature Emergency Engagement group** – public stakeholder engagement - community stakeholders and public forum re Climate and Nature Emergency work by the council and partners in S Gloucestershire.

**South Gloucestershire Local Strategic Partnership** – local strategic stakeholders re business, research innovation, investment and Climate Emergency action including Business West, University of the West of England, Avon and Somerset Fire Service, Airbus, Rolls Royce, CVS South Gloucestershire, Avon Wildlife Trust.

**Greater Southeast Net Zero Hub:** Having worked closely with WSCC to collaborate on decarbonisation projects and share learning, and the Coast to Capital Local Enterprise Partnership.

**South Downs National Park Authority:** As a tier 1 authority, WSCC works closely with the six Districts and Borough authorities in West Sussex, plus Brighton and Hove Council and East Sussex County Council. This is where WSCC have trailed their initial cut and collect initiative.

**West of England Nature Partnership:** Local Nature Partnership which brings together local authority and environmental sector partners to champion nature recovery and application of nature-based solutions and innovation across the West of England –



**Sussex Local Nature Partnership:** WSCC are part of The Sussex Nature Partnership (SxNP). It is a voluntary partnership of over 30 organisations covering the whole of Sussex. It works through partnership and collaboration to “protect and expand natural capital and everything it gives us”

## 2.6. A description of the drivers for change

Based on the current evidence and review of the highway service the underlying drivers for the need to change include:

- **Revenue Pressures** – Pressures on revenue budgets are forcing local authorities to reduce operational costs where possible.
- **Lack of systems thinking** – siloed working, and lack of interconnectivity in carbon modelling between highways services and Local Authority operations/functions has limited progress in decarbonisation, as critical opportunities are missed
- **Carbon measuring and tracking** – the tools tend to focus on blacktop and road maintenance, there is a critical need for tools to comprehensively track whole life carbon emissions across all components of the local highways maintenance system
- **Piecemeal application of new tech** – despite emerging technology becoming available, such as Anaerobic digestion, Pyrolysis, advanced plant and machinery and data analytics, their application has remained isolated and unvalidated, preventing widespread adoption
- **Scope 3 & fugitive emissions** – fugitive emissions across the value chain of green estate management remain un-tracked and un-managed, while it still remains unclear about a significant amount of Scope 3 within SGC and WSCC
- **Cross sector decarbonisation** - Cross sector decarbonisation is inherently challenging, and requires the collaboration of competing teams, strategies, and partners. This is compounded by the heterogenous structure of local authorities, that vary widely between insourcing/outsourcing, devolution and ownership/availability of assets that may come into play, eg anaerobic digesters.
- **Legislative restrictions** – some authorities face legislation that prevents them collecting and transporting verge biomass, as the governance and contracting models do not facilitate inter-function operations
- **Green arisings have historically been viewed as ‘waste’ rather than ‘resource’** – the cultural narrative, processes and business models are designed with this view
- **Materials under pressure** – with increasing temperatures due to the changing climate and higher weight of electric vehicles, innovation in highways materials is urgently needed to optimise highway infrastructure thermal and functional resilience and deliver net zero.



## 2.7. Golden Thread / Green Thread

This “Green” Thread highlights how the programme has a line of sight from the issues and drivers for change to the outcomes Greenprint is looking to achieve.

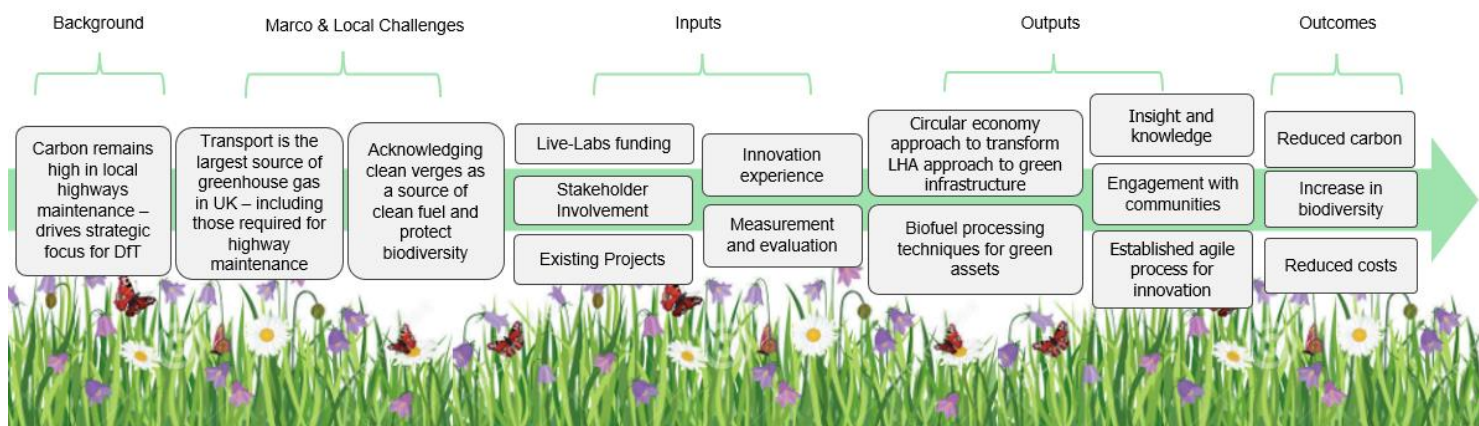


Figure 4: Golden Thread

## 2.8. Details of how you will measure impacts and how these link with M&E activities

The M&E programme described in section 9 is dependent on the wider Livelabs programme (including M&E, currently out to tender) and will be further developed during mobilisation and as details of the wider programme are confirmed.

Based the priorities for M&E that are defined in section 9, current proposals for M&E for the Greenprint project include the following.

M&E overview	Measurables
Carbon	FHRG tool for scope 1, 2 and 3 emissions
	Further research into impact on embedded soil carbon
	Further research into impact on biogenic emissions
Sector Impact	Quantify number of local authorities applying Greenprint
	Quantify number of contractors applying Greenprint
	Quantify availability of equipment supporting Greenprint solutions
	Quantify workforce EDI outcomes of Greenprint including number of people from protected characteristic and underrepresented groups involved in the project
Behavioural Change	Encourage whole system approaches to innovation and problem solving
	Carbon accounting embedded at the heart of decision making
	Community behaviours: tracking feedback and attitudes to changes in verge management and communications
Customer Satisfaction	External customers: members of the public, operational partners, other local authority bodies, contractors
	Internal customers: other departments within local authorities
Social Value	The national TOMS (Themes, Outcomes, Measures) framework will be used to define and measure social value generated and delivered by the project





Cost	Monitoring of capital and revenue costs
Biodiversity	Evaluate the baseline environmental benefits delivered by a select set of verges
	Produce an Excel-based Tool to assess the potential future gains in environmental benefits that can be achieved through a change in verge management practice
	Provide recommendations for further analysis and environmental action

Table 1b: Proposed structure for M&E programme

## 2.9. Details of process / locational maps where appropriate

Sites across West Sussex and South Gloucestershire as below:

**SGC:** For the first phase of Greenprint the town of Yate is the first area where the project will trial cut and collect. The site below includes areas the project will use for storage of plant and will be the operations base for the programme.

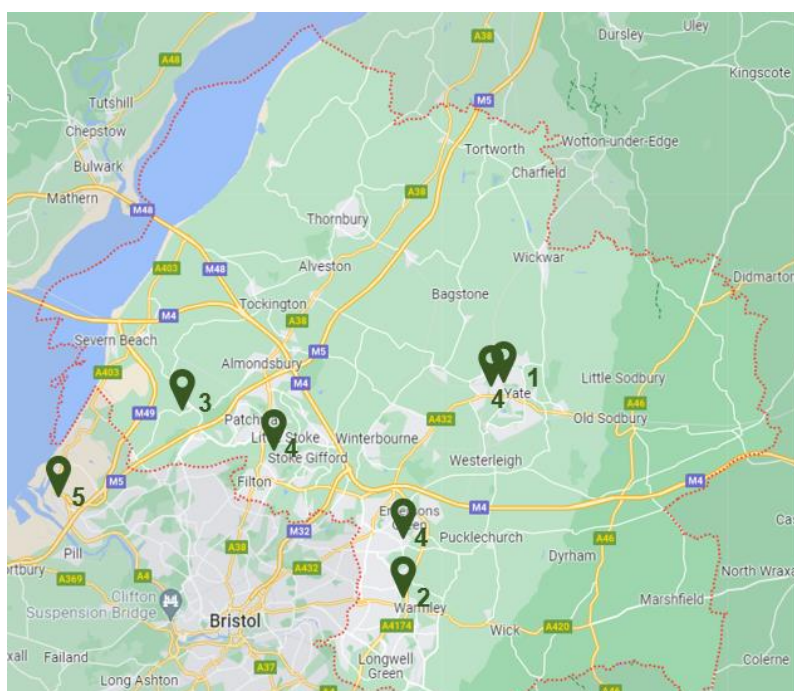


Figure 5: Locational maps for SGC

**Test Bed 1:** Yate, Broad Lane Highways Operations and Grounds Maintenance Depot – storage of plant and operations base

**Test Bed 2:** Kingswood, Brook Road Highways Operations and Grounds Maintenance Depot – storage of plant and operations base

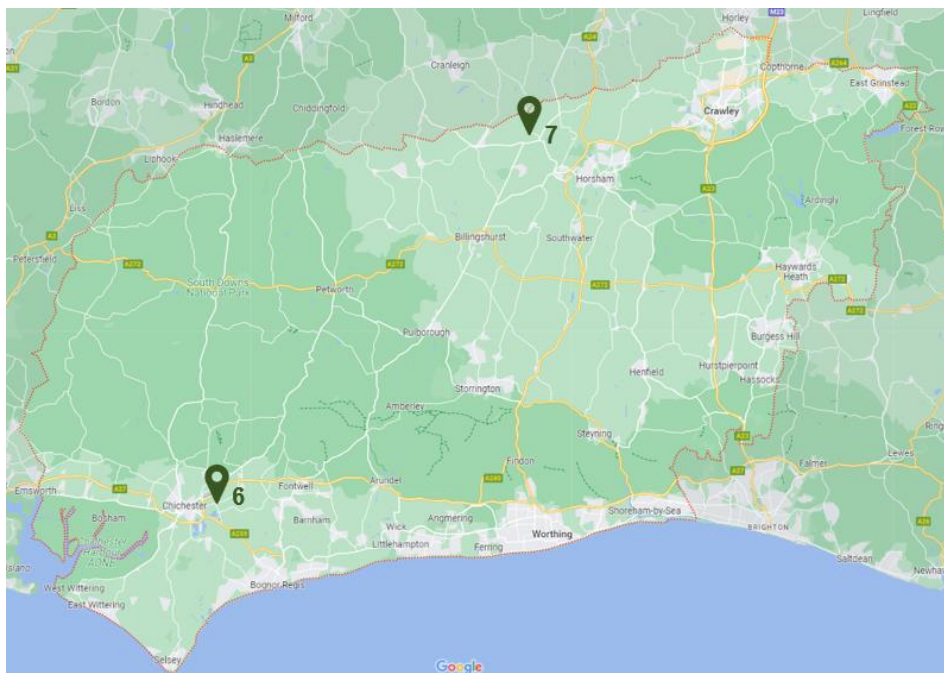
**Test Bed 3:** Patchway, Hollywood Lane Highways Operations and Grounds Maintenance Depot, – storage of plant and operations base

**Test Bed 4:** Waste Recycling centres at – Mangotsfield, Yate and Filton – verge arisings will be brought to these centres for collection by Suez with food waste for Anaerobic digestion.

**Test Bed 5:** Anaerobic digestion plant in Avonmouth



**WSSC:** For the first phase of Greenprint WSSC will undertake cut and collect on 80km of urban/rural verge network. The site below includes areas used for storage of plant and will be the operations base for the programme.



**Test Bed 6:** WSSC Drayton Highways Operations and Grounds Maintenance Depot

**Test Bed 7:** Grasstex, WSSC grass cutting contractor

Figure 6: Locational maps for WSSC



## 2.10. Theory of Change

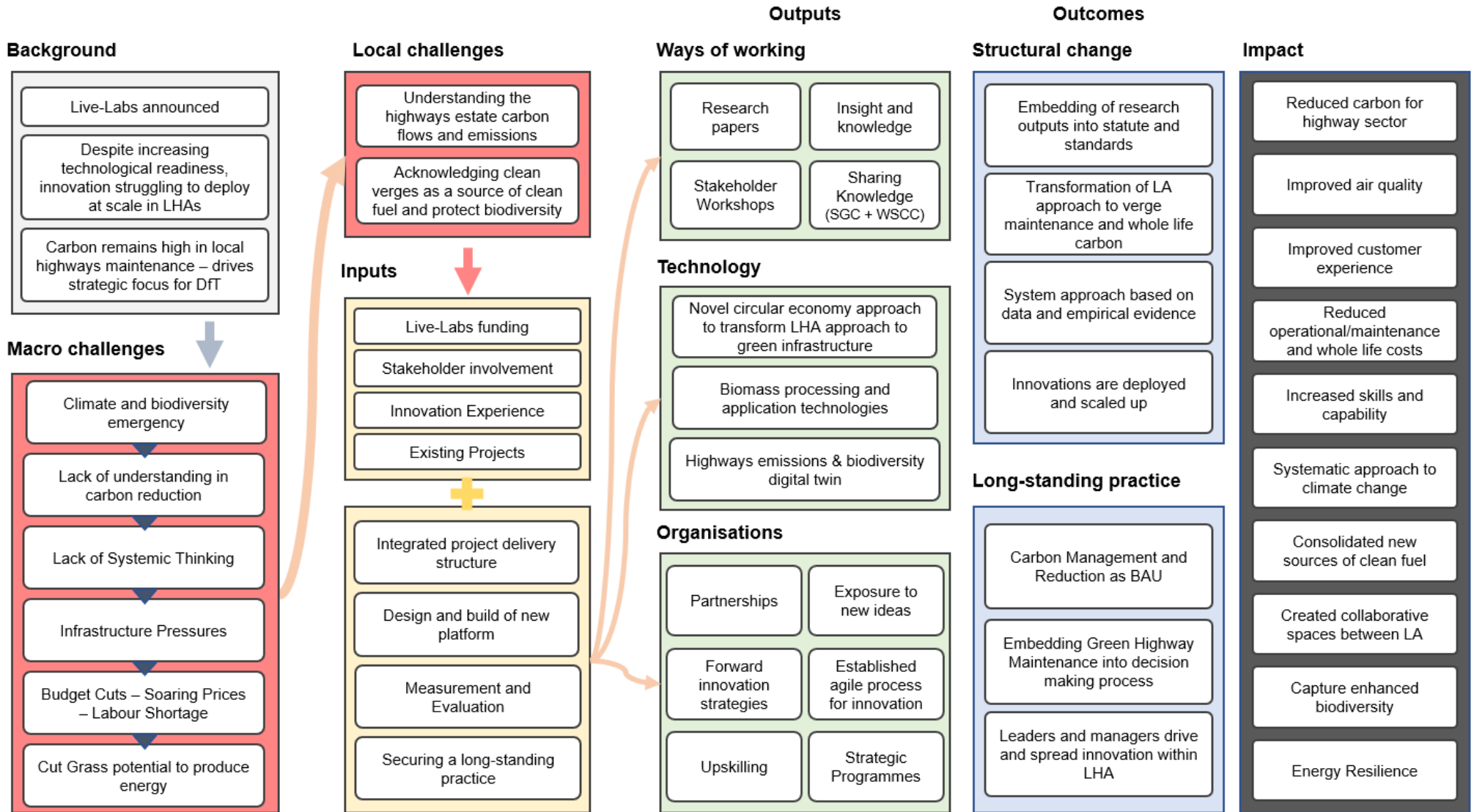


Figure 7: Greenprint theory of change



The Theory of Change presented above summarises how project elements (collecting biomass, biomass processing and biomass applications) align with the wider Live Labs programme (including communications, M&E and EDI) to deliver to proposed outcomes and impact.

The impacts in the Greenprint theory of change are listed in the table below to show linkages between impacts and the activity through which they will be achieved:

Impacts (as set out in OBC Theory of Change)	Linkages	Activity
Reduced carbon for highway sector	Verges are cut less often, reducing machinery use and scope 1, 2, and/or 3 emissions (depending on procurement route)	Collecting biomass
	Reduced biogenic emissions (CO <sub>2</sub> and CH <sub>4</sub> ) from leaving arisings to compost in place	Collecting biomass
	Increased quantity of CO <sub>2</sub> embedded in soil through biodiversity and plant structure	Collecting biomass
	Production of hydrochar to be tested as additive for road surfaces, reducing carbon content, and increasing road lifespan	Biomass processing
	Production of biogas replacing natural gas for generation of heat and power.	Biomass applications
	Testing models for refining biomethane into transport fuel, replacing diesel or petrol	Biomass applications
Improved air quality	Fewer cuts result in reduced machinery hours and reduced traffic disruption resulting in lower exhaust emissions.	Collecting biomass
Improved customer experience	Fewer cuts leading to reduced disruption and traffic delays	Collecting biomass
	Collection of arisings improves aesthetics of verges and supports community relations	Collecting biomass
	Communications with local communities to raise awareness, understanding and support for objectives and benefits	Livelabs programme engagement
	Project design and delivery will consider Equality Diversity and Inclusion (EDI) needs through EDI engagement	Livelabs programme engagement
Reduced operational/maintenance and whole life costs	Fewer cuts result in reduced machinery hours and greater longevity	Collecting biomass
Increased skills and capacity	Whole system approach to innovation and learning will develop skills within project partners	Livelabs programme engagement
	Proactive sharing of learning will develop skills across UK local authorities	Livelabs programme engagement
	Testing and dissemination of innovation will benefit UK PLC	Livelabs programme engagement
	Implementation of the EDI workplan will increase diversity, skills and capacity of partner workforces	Livelabs programme engagement



Systematic approach to climate change	Whole system approach to carbon monitoring, decision making and investment will strengthen project partners	Livelabs programme engagement
	Whole system approach to carbon monitoring, decision making and investment will strengthen approach for UK local authorities	Livelabs programme engagement
Consolidated new sources of clean fuel	Production of biogas replacing natural gas for generation of heat and power.	Biomass applications
	Testing models for refining biomethane into transport fuel, replacing diesel or petrol	Biomass applications
Created collaborative spaces between LA	Proactive sharing of learning will demonstrate value of collaboration across UK local authorities	Livelabs programme engagement
Capture enhanced biodiversity	Cut and collect allows greater control of verge growth rates, allowing harvesting to be optimised for biodiversity	Collecting biomass
Energy resilience	Testing business model for biomass processing and distributed, small scale power generation	Biomass applications

Table 1c: Linkages within Theory of change

### 3. The Economic Case (5 sides of A4)

This case demonstrates public value by comparing the economic performance of the business-as-usual scenario in which the highway verge is managed as at present, and comparing this to the do-something case where the Greenprint measures are implemented. A Value for Money (VfM) category is assigned by comparing the monetised benefits to the costs of the scheme.

The DfT's and ADEPT's guidance document 'OBC Guidance v1', outlines the criteria that should be covered as part of the Economic Case for LL2. Table 2 shows where the relevant information, in accordance with the requirements can be found in subsequent sections that make up the Economic Case.

Content	ADEPT & DfT Requirements	OBC section
<b>Value for Money</b>	A proposed value for money category(s) for the investment proposal (using DfT VfM framework) reflecting the Benefit-Cost Ratio, non-monetised impacts and risks and uncertainties.	3.4
<b>Benefit-Cost Ratio</b>	Projected Benefit-Cost Ratio(s) informing the value for money category with a breakdown of the estimated costs and benefits and discussion of any significant risks and uncertainties that might influence a scheme's value for money	3.4
<b>Sensitivity Testing</b>	Sensitivity testing to provide an understanding of the impact of the risks and uncertainties	3.5
<b>Metrics</b>	Key metrics such as projected infrastructure costs, supporting costs, and costs per tonne of carbon saved	3.1, 3.2, 3.3

Table 2: ADEPT & DfT requirements for the Economic Case



### 3.1. Benefits by category

#### Emissions reduction

As expressed in the Government’s policy paper “Valuation of greenhouse gas emissions for policy appraisal and evaluation”, reductions in emissions generate an economic value that society places on the prevention of a unit mass emission of carbon dioxide (CO<sub>2</sub>) or another greenhouse gas factored by its Global Warming Potential (GWP) relative to that of CO<sub>2</sub>, and/or the financial cost to local authorities to offset their emissions. Benefits are expressed in £ per tonne of CO<sub>2</sub> equivalent (CO<sub>2</sub>e) as shown in Figure 8 with a central series representing the core value while low and high series represent a 50% uncertainty in the values, lower and higher respectively.

Quantification of baseline emissions (and the methodology of doing so) will be performed over the first year of the project once consumption and sequestration values are available. Further details on the calculation of emissions are discussed in Section 7.2 of this document. Once a change in the baseline emissions has been quantified, it will be monetised using the values from Figure 8.

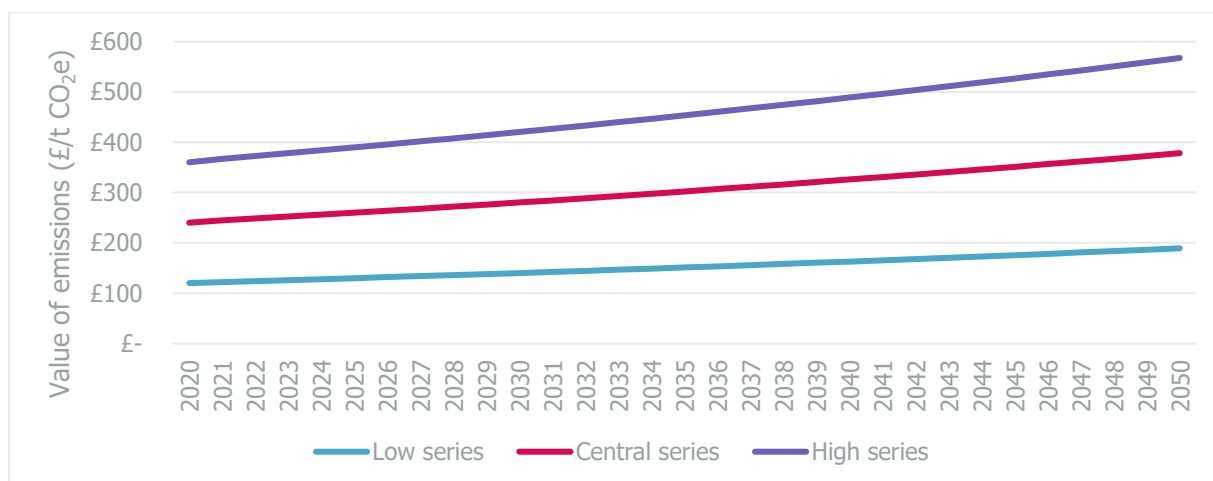


Figure 8: Valuation of carbon dioxide equivalent emissions per tonne

#### Biodiversity

Under the Environment Act 2022, almost all planning permissions granted in England from the end of 2023 onwards must deliver at least 10% biodiversity net gain (BNG). Natural England has developed the Biodiversity Metric accounting tool to provide a standardised methodology by which the number of BNG units is calculated.

In its BNG consultation document, the Department for Environment, Food & Rural Affairs (DEFRA) estimated a tariff on biodiversity of between £9,000 and £12,000 per unit over a 100-year appraisal period. However, the Verges Natural Capital Assessment for South Gloucestershire Council published by Eunomia in December 2022 (eunomia, 2022) estimated the market value of that unit at almost £26,000 per 100 years. This larger figure is likely due to higher land values in South Gloucestershire.

The economic value of BNG will be calculated using Natural England’s Biodiversity Metric Calculation Tool when the inputs (verge length, verge quality and cut rate) have been finalised. The final requirements and guidance regarding BNG implementation are due to be issued by government this year (2023), and whilst out of direct scope of Greenprint, the team will keep a watching brief



regarding opportunities and requirements to include within Greenprint or signpost for dissemination across the sector.

## Traffic

Any reduction in vehicle movements and maintenance requirements on the carriageway and/or verge will result in improved Transport Economic Efficiency (TEE) as journey times and vehicle kilometres will be reduced. The economic value of TEE will be calculated when the inputs (number of vehicle movements, change in vehicle distance and journey time) have been finalised and this is anticipated to occur over the first year of the project.

## Other

As highlighted in the SGC Verges Natural Capital Assessment, there are economic values associated with improved air quality and flood regulation, however changes in management of the verge alone (i.e., without hedgerow or tree planting) have no net economic effect in these categories. There is a small net benefit to the public purse associated with a reduction in the risk of grass fires as the costs to operate the fire service and the consumables used in firefighting will be reduced. Additionally, the cut-and-collect process should improve the ability of the soil to sequester greenhouse gasses, permitting natural insetting which is both environmentally and economically preferable to offsetting through the purchase of carbon credits on the open market.

## 3.2. Benefits by stage

### Innovation Management

Successful innovation is vital to delivering net zero emissions, a key factor in harnessing talent to drive growth across the UK, and critically is an enabler for improving the services provided to the travelling public. Whilst innovation is critical, the industry has been slow to adopt new innovations, especially low carbon materials. There are many reasons for this, including restriction placed on contractors and suppliers by the specifications on long term contracts. The industry has added to this through uncoordinated trials and knowledge not effectively shared across the industry.

One of the key benefits of the Live Labs programme is that it recognises that whilst innovation is critical it also needs to be carefully managed to ensure the realisation of benefits and capturing learning. As part of the project, the economic benefits of innovation management will be highlighted:

- Faster introduction of new products, higher launch success rates and scalability
- Earlier detection of non-viable ideas and better plans for implementation
- Greater operational and financial efficiency
- Better integration between all departments for quicker results and improved teamwork and relationships – this includes with other local authorities

Each of these benefits will be monitored and measured throughout the project in accordance with the Monitoring and Evaluation Plan discussed in Chapter 9 of this business case.

### Project Stage (Year 1 – Year 3)

As part of the trial, there are three categories of activities which are expected to generate economic benefits. These will accrue over the three-year trial period.



- Reduction of the number of grass cutting events per year will result in a reduction in vehicle kilometres and therefore emissions. While the reduction may not be linear since additional vehicle movements are needed to transport the cuttings which were previously left in situ, a net benefit is expected.
- Removal of the grass cuttings should reduce in CO<sub>2</sub>e emissions. The science underpinning the case for change<sup>1</sup> identifies that preventing the release of methane into the atmosphere which occurs when grass decomposes in situ will reduce methane emissions which have a high GWP (around 36 times that of CO<sub>2</sub>). Grass collected will instead be processed by an Anaerobic Digestion Plant and the biogas and other outputs captured used delivering financial and carbon emissions reduction benefits.
- Fewer grass-cutting events and longer periods between cuts will improve biodiversity as wildflowers and other non-grasses will be able to grow and seed, providing a richer and more diverse roadside environment and increased soil carbon sequestration. This will result in a positive BNG. It should also reduce the fire risk and increasing carbon sequestration can mitigate wider council residual emissions and associated costs.

Ambitions are for this innovation project to be scaled up across both counties. It is anticipated that all of the benefits of the trial stage would increase with economies of scale such as more intensive use of vehicles, operatives and digesting equipment likely to result in reduced marginal costs.

There are also anticipated to be new categories of benefits when the innovation project is fully live:

- Larger scale digestion or pyrolysis of grass cuttings should allow for the production of biofuels for use in the council fleet. Evidence underpinning this case for change identifies that converting a vehicle from diesel fuel to biogas and biomethane from verge cuttings will result in a 76% reduction in CO<sub>2</sub>e emissions over a vehicle's lifetime, which should offset the increased purchase and/or fuel conversion costs.
- The digestion and/or pyrolysis activities will allow for production of a biochar-modified asphalt binder which will have an increased deformation resistance relative to existing asphalt binders. It is anticipated that this will reduce the maintenance requirements on the highway resulting in a TEE benefits while the emissions associated with maintenance activities will fall by between 10% and 25%; This product is also anticipated to have a market value of its own.

## Greenprint Sharing (Year 4+)

Sharing and wider adoption by other councils of the "Greenprint" (the blueprint of the systems model for green infrastructure management), once complete, is expected to result in wider and increased realisation of the benefits identified above which will have economic value.

Best practice development through the "Greenprint" process will prevent other councils spending in these areas since the research has already been done as part of this project. This will reduce public spending and enable limited council resources to be utilised in other areas.

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<sup>1</sup> Atkins, P.; Milton, G.; Atkins, A.; Morgan, R. A Local Ecosystem Assessment of the Potential for Net Negative Heavy-Duty Truck Greenhouse Gas Emissions through Biomethane Upcycling. *Energies* **2021**, *14*, 806. <https://doi.org/10.3390/en14040806>





### 3.3. Project Costs

The project costs are listed in Table 10 and total £4,027,065, inclusive of a Quantified Risk Assessment (QRA). All benefits and costs, as profiled in Table 11, were rebased to the Present Year of 2020, the Government’s price base year for CO<sub>2</sub> emissions, using its GDP Deflator series with a 2020 base, accounting for the impacts of inflation on costs occurring in the future. All values are further discounted to represent the social time preference for the consumption of goods and services now rather than in the future. The resultant Present Year Costs are shown in Table 3.

Year incurred	Costs at 2022 values	GDP deflator	Discount rate	Present Value costs
2023	£1,566,019	108.09	1.035 <sup>3</sup> =1.109	£1,352,981
2024	£1,170,126	109.87	1.035 <sup>4</sup> =1.148	£976,758
2025	£1,250,920	110.72	1.035 <sup>5</sup> =1.188	£1,008,889
Present value of costs				£3,338,628

Table 3: Quoted and present value costs

### 3.4. Value for Money

The VfM Category will be determined by dividing the present value of benefits once calculated by the present value of costs shown in Table 3. This benefit cost ratio (BCR) will be assigned a VfM category under the Department for Transport’s Value for Money framework.

The purpose of the year 1 Trial Stage is to develop, test and demonstrate the changes to green infrastructure management part of the “live lab”; it is therefore not anticipated to generate sufficient economic benefits against the costs listed in Table 3.1 and a poor VfM category is anticipated given the scale of the trial. However, given the imperative of generating net carbon-negative systems on the local, national and global scale, this still represents a good investment towards that goal and the opportunity cost of performing another action should be considered.

It is hoped that the economies of scale associated with the wider innovation project, in conjunction with the material benefits of biofuels and biochar produced, will improve the net benefits such that they outweigh the costs and generate at least a Low VfM category with a BCR of at least 1.

The “Greenprint” model, once generated, will have negligible costs associated with its upkeep (costs are no longer considered within the BCR or VfM category once sunk) but should continue to generate benefits for users by enabling efficiency and reducing wasteful research spending. On its own, it will therefore have a very high VfM, but as part of a wider countywide or nationwide implementation, it should serve to supplement the VfM obtained from the wider innovation project.

### 3.5. Sensitivity Tests

The core scenario utilises the Central series of CO<sub>2</sub>e emissions economic values. Sensitivity tests are therefore recommended Low and High series values were substituted.

The prospective volume of emissions reduced through use of deformation-resistant surfacing material is estimated at 10% to 25% with a central estimate of 17.5% forming the core scenario.



Sensitivity tests should therefore be performed with this benefit reduced to the lower bound of 10% and increased to the upper bound of 25%.

The core assessment should use a valuation of approximately £26,000 for a BNG unit, based upon data specific to South Gloucestershire. A sensitivity should therefore be performed with the value of a BNG unit reduced to £10,500 which is the median tariff anticipated by DEFRA.

### 3.6. Risk

The major risk with any innovation scheme is that it fails to recoup the costs to the levels anticipated. A robust monitoring programme should be in place to ensure that the expected benefits are accruing and that the volumes of emissions reduction and digestion/hydrolysis production are within the ranges expected.

The scheme aims to investigate barriers for councils to apply cut and collect and utilise their biomass resources. This cannot be valued economically, but instead barriers represent a risk to the generation of benefits through this scheme.

As discussed above, a QRA was used to adjust the project costs through quantification of the risks to costs and timescales. The QRA is presented in full in Appendix B.

## 4. The Commercial Case (5 sides of A4)

### 4.1. Approach

The DfT's and ADEPT's guidance document 'OBC Guidance v1', outlines the criteria that should be covered as part of the Commercial Case for LL2. Table 4 shows where the relevant information, in accordance with the requirements can be found in subsequent sections.

Content	ADEPT & DfT Requirements	OBC section
<b>Procurement Activities</b>	Clear statement of the projected procurement / intellectual activities	4.2
<b>Procurement Routes</b>	The intended procurement routes for the project's key outputs and activities as well as how they will secure the factors outlined in the economic case	4.3
<b>Compliance</b>	How the proposed approach will comply with procurement, subsidy control and, where applicable, state aid regimes inc. Section 151 / 73 officer sign off	4.4
<b>Sourcing Options</b>	The sourcing options available and the rationale for the preferred option	4.5
<b>Procurement Plan</b>	A procurement plan with timescales	4.6
<b>Supply Side Arrangements</b>	Any early consultation with the supply side, making reference to any existing supplier or partnership arrangements	4.7
<b>Specification</b>	As so far as is possible, an outline output / outcome based specification	4.8

Table 4: ADEPT & DfT requirements for the Commercial Case

### 4.2. Projected Procurement / Intellectual Activities

#### Projected Procurement

This project is a joint proposition between SGC, WSCC and its supply chain partners. Each Local Authority has a different contract delivery model for highways maintenance services. SGC self-delivers much of their routine maintenance through their Direct Labour Organisation (DLO) whilst



WSC contracts their services through outsourced Maintenance Contracts. These different models will require differing approaches to procuring Plant, Equipment & Delivery. South Gloucestershire intends to purchase plant and machinery whereas West Sussex will use existing contracts to lease equipment to deliver as part of a change in service requirement; Professional services can be common.

### Intellectual Activities

Workstream Item	
Outline Business Case	These activities have been identified as key activities & workstreams to deliver this project. These will be delivered through a combination of in-house delivery and procurement through existing delivery contracts and new SME partnerships.
PMO and project management	
Strategic carbon analytics	
Verge management	
Biomass processing	
Biomass applications	
Strategic 'Greenprint' Outputs	
Communications	
Corporate Functions	

Table 5: Greenprint workstreams – commercial case

Procurement can be broken down into three main activities:

- 1) Professional Services** - Advisory Services through a small network of specialist trusted partners. These include, Project/Programme Management, Expertise in Biomass Processing (Anaerobic Digestion, Pyrolysis, Hydrothermal Carbonisation), Carbon Management, Highway Maintenance (verge management), Communication, System Engineered Method (Blueprint), Environment, Legal and Equality & Inclusivity
- 2) Plant & Equipment** - Procurement of specialist plant and equipment to enable the trials to be delivered. This is proposed to be procured as an Asset for South Gloucestershire and leased through the existing grass cutting contractor in West Sussex.
- 3) Works Delivery** - Procurement of Contractors for Delivery Services including Grass/vegetation cutting & collecting, Biomass Processing, Biomass Application analysis & testing, Carbon monitoring method, environmental impact assessment, sharing of knowledge, full Greenprint business case.

### 4.3. Procurement Routes

The final programme review undertaken by Proving Services for Live Labs 1 identifies that the teams were unprepared for the uniqueness of the programme and funding mechanism which proved challenging. The project have engaged early with the procurement teams to ensure the agreed procurement channels provide the necessary assurance and that any risks will be addressed.

#### Preferred Procurement Routes

##### Professional Services

Both WSCC & SGC have internal specialists that will be mobilised on the project. They have also access to Professional Services Frameworks for works and consultancy support. With the specialist nature of some aspects of this project and the knowledge and experience gained to date through existing partnerships, the project will seek to keep some partnership in newly defined roles. The



project have established links with Universities of West England, Brighton and Leeds and will be commissioning specific research and innovation.

### Plant & Equipment

WSCC intend to use its existing vegetation clearance contract with Grasstex to support this programme. WSCC will also be looking to acquire a mobile digestive unit and have already purchased trailers in preparation for the project. Instruction for a contract variation to provide a cut and collect service can be issued through this contract to provide the services required. Further understanding will be sought for lead-in times.

SGC’s preference will be to purchase plant & equipment directly as part of its DLO. These would be taken on as assets to be managed as a depreciating asset and sold on in the future. Consideration will also be given to leasing equipment depending on availability and timelines to deliver.

The following Frameworks in Table 6 are available to procure Plant & Equipment. Consideration will need to be given to the lead-in times for delivery, these are known to be lengthy at present.

Framework Reference & Title	Organisation	Framework End Date
F07177 Southern Construction Framework 4	Hampshire/Devon County Council	30/04/2023
Integrated Consultancy Framework (SCF Consultant)	Devon County Council	02/08/2024
960 - Specialist Vehicles	YPO	04/10/2023
YPO1004 Plant Machinery	YPO	30/03/2024
RM6168 Estate Management Services	CCS	15/07/2024
ESPO YPO 664 21 Consultancy Services	ESPO/YPO	31/08/2023
NEPO224 HGV and Specialist Vehicles	TPPL/NEPO	03/01/2025
1066 Alternatively Fuelled Vehicles (DPS)	YPO	05/05/2031
RM6187 Management Consultancy MCF3	CCS	23/08/2025

Table 6: Frameworks available to procure Plant & Equipment

### 4.4. Section 151 / 73 Officer Sign Off

Section 4.3 highlights the approach to go through SGC and WSCC procurement protocols. This includes getting section 151 / 73 officer sign off from Chief Officers of both Community Operations and Asset & Procurement. Please see Table 7 below for current sign off from Section 151 Officers.

Organisation	SGC	WSCC
<b>Name:</b>	Nina Philippidis	Taryn Eves
<b>Role:</b>	Service Director Finance (S151 Officer)	Director of Finance and Support Services (S151 Officer)
<b>Signature:</b>	See PDF version of LL2-OBC-SGCWSCC-002	See PDF version of LL2-OBC-SGCWSCC-002

Table 7: Section 151 / 73 officer sign off



## 4.5. Sourcing Options

This section provides insight into the procurement options. Procurement is an integral part of the project management process. The procurement strategy has been designed to ensure:

- Value for money – SGC & WSCC are under a duty to secure value for money in all its transactions.
- Compliance with legislation - a wide variety of UK and European Union legislation and regulations apply.
- Avoidance of fraud and corruption - procurement must be visible and tightly controlled to limit potential fraud and avoid any suggestion of corruption.
- The promoting / procuring authorities vision and ambitions: procurement contributes directly to the delivery of SGC & WSCC vision and long-term ambitions.
- Fulfil the commercial cases scheme objectives.
- Flexibility - allow for future schemes, development, innovation and new technology, ensuring SGC & WSCC are not locked into long-term agreements.

The Public Contracts Directive 2014 issued by the European Union was implemented in the UK through the Public Contracts Regulations 2015. South Gloucestershire & West Sussex as the public authority responsible for procuring this project, are required to comply with these Regulations. The Regulations describe a number of options for procurement processes for contracts and the criteria which determine which of these options can be applied. The options given are:

- One Procedure
- Restricted Procedure
- Direct Award with a Waiver – (specialist Suppliers)
- Existing Contract Award

Both SGC & WSCC have clear Procurement Procedures and existing Frameworks and Routes to secure works and services. This essentially boils down to:

The normal procurement routes are as follows, depending on contract value:

- Below £5K – direct award based on a single written quote.
- £5-£75K – at least three written quotes. Appointment based on MEAT.
- Above £75K – open tender. Appointment based on MEAT.

Direct Award above £5K possible in exceptional circumstances e.g.

- Insufficient time to undertake full tender process,
- Limited supply market e.g. specialist contractor required with unique skills.

## 4.6. Outline Procurement Plan

The timing of procuring each partner is still to be determined in line with project programme in Appendix A. The estimated timelines are shown below:





Figure 9 gives an estimate of the project work packages, their commencement date and their duration. Within each workstream the project will be using different suppliers to help deliver the workstream.

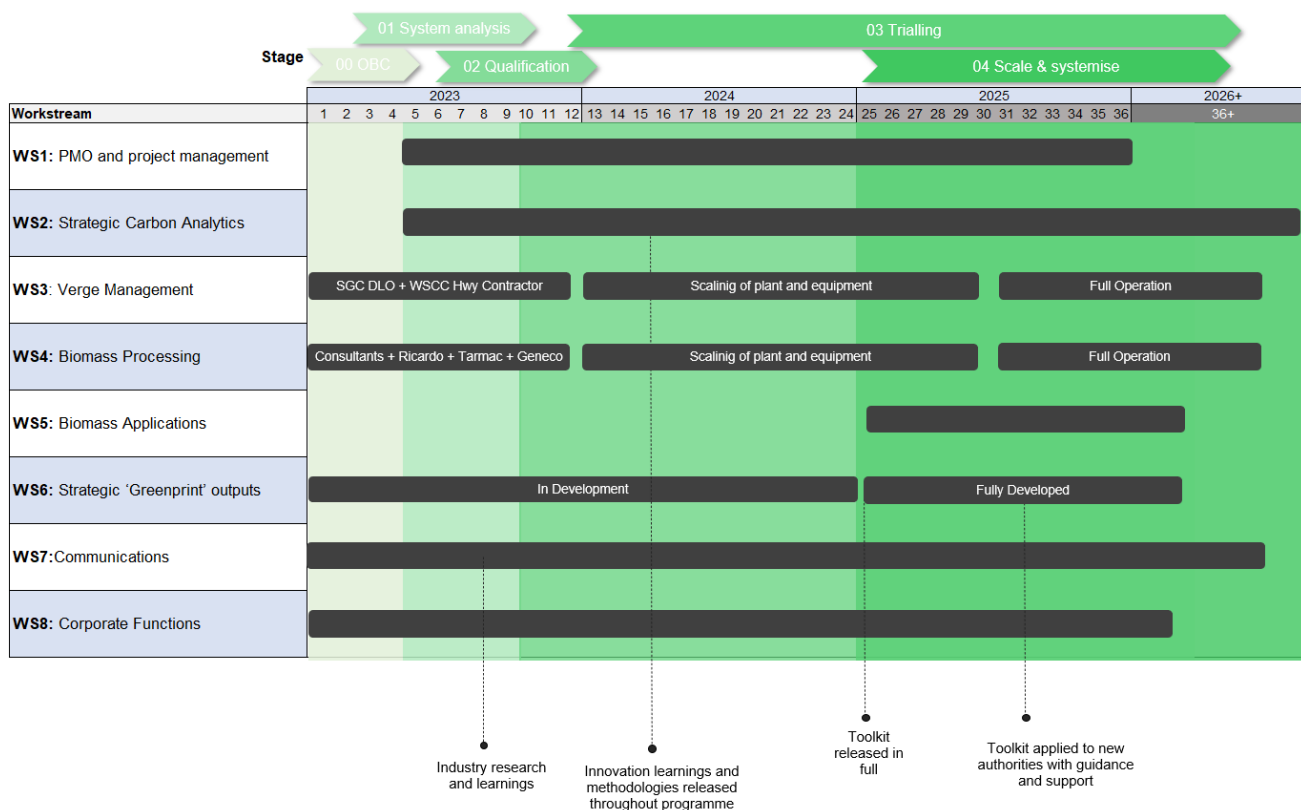


Figure 9: Outline procurement plan by workstream

### 4.7. Early Consultation with the Supply Side

Early consultation has begun with a number of the key supply chain partners. This is to ensure that all legal, compliance, governance and procurement procedures can be completed in advance of the anticipated work commencement date. Thereby ensuring a quick onboarding and minimal delays to the work starting.

The list below shows the Consortium of Suppliers with whom early consultation has begun:

- Amey Consulting – An established innovation partner and experience with project support from Live Labs 1
- Peakhill Associates – Technical advisors for biomass processing and applications
- Plantlife International: The Wild Plant Conservation Charity – Technical advisors for biodiversity and verge management.
- Grasstex – Current supplier for verge maintenance
- GENeco – Providers of the AD Plant to be used as part of the project

### 4.8. Outline Output / Outcome-based Specification

1. Deliver a fit for purpose Carbon Model for monitoring the 'Greenprint' trial Whole Life Cycle. Work within existing WSCC Carbon Monitoring Framework and innovations were needed to produce a credible model of monitoring direct carbon emissions and potential for 'insetting' emissions.



2. Review, test and restructure the operation for Highway verge management with the view to implement a Whole Life Cycle management, including:
  - a. Maintenance regime, technology and processes
  - b. Plants and materials
  - c. Infrastructures and logistic including storage and transport of Bio-carburants and by-products
3. Research and adapt biomass technology (Hydrothermal Carbonisation + Anaerobic Digestion) with the view to derive direct applications in a local circular economy, including:
  - a. Confirm and validate the selected technologies with laboratory and in-situ trials
  - b. Identify other ‘innovations’: Evaluate and undertake trials (this is unknown yet and will be deliver through Agile process)
  - c. Define and evaluate the use and economic viability of bio-carburants and by-products in context
4. Build an economic and benefits case of the Whole Life Cycle of the trial suitable to extrapolate for various pre-defined scenarios/options
5. Produce a fit for purpose Environment Impact Assessment or suitable Environment Assessment to optimise the biotope and reduce carbon impact
6. Review and propose legislative temporary or/and permanent changes to remove hinderance against the Whole Life Cycle trial and future applications
7. Monitor, evaluate, verify and establish a full systems engineering of the Whole Life Cycle (Blueprint) to be shared with other local authorities as a “How to do”
8. Produce an Equality Impact Assessment fit for purpose
9. Communicate and promote at all levels the trial progress and results to gain support and leadership in transformation

## 5. The Financial Case (5 sides of A4)

### 5.1. Approach

The DfT’s and ADEPT’s guidance document ‘OBC Guidance v1’, outlines the criteria that should be covered as part of the Financial Case for LL2. Table 8 shows where the relevant information, in accordance with the requirements can be found in subsequent sections that.

Content	ADEPT & DfT Requirements	OBC section
<b>Funding Profile</b>	Details of a funding profile setting out capital and support lines including whole life costs and any risks.	5.2 Programme Costs 5.3 Programme Funding
<b>Match Funding</b>	Description of any contribution or match funding being provided by the local authority or a third party. Where applicable, accompanied by a written statement of support from the relevant budget holder.	5.3 Programme Funding
<b>Financial Responsibility</b>	Details on accepting financial responsibility for the project going forward and background on sources of other funding contributions, and how funding has been secured.	5.4 Financial Responsibility



<b>Financial Viability</b>	As so far as is possible, demonstrate the long-term financial viability of the proposal by providing an explanation of how the proposal will be sustained beyond the life span of the scheme including how benefits will endure beyond the period of the scheme without any further funding	5.5 Financial Viability
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Table 8: ADEPT & DfT requirements for the Financial Case

## 5.2. Programme Costs

The costs outlined in this section are the revised figures from the expression of interest. The costs for the revised Greenprint LL2 project have been calculated based on the design of the programme plan outlined in Appendix A. Appendix C contains a breakdown of these costs by council. The cost of the project is deemed reasonable and affordable given the scope of the issues identified in the Strategic Case and the predicted benefits of the scheme as evaluated in the Economic Case. The costs encompass workstreams such as project management, carbon analytics, verge management, the processing of the biomass, the applications of the biomass, the strategic outputs as well as the communications and corporate functions activities.

The total base cost required to complete the project is £3,834,818 as presented in Table 8. In addition, a sum of £192,247 has been estimated to account for risks, as shown in Table 9.

Altogether, the total cost of the project, which is the amount being requested, is £4,027,065.

### Base Costs

Base costs have been produced by SGC and WSCC to show the combined costs. The cost estimates include the following workstreams:

- **Outline Business Case:** A 3-month sprint to set out the preliminary thoughts regarding the proposed project following a proven DfT approach in the spirit of The Green Book.
- **PMO and project management:** All project management costs to ensure the programme is completed on time, within budget and to the expected quality standards
- **Strategic carbon analytics:** Deliver a measuring and reducing carbon model comprising a carbon baseline, benefits, measurement, fugitive and residual emissions and model greenhouse gas emissions across scope 1, 2 and 3 emissions and life cycles and to coordinate the technical activities of the members of the technical and research innovation groups so as to deliver a fit-for-purpose carbon model.
- **Verge management:** Manage and oversee the investigatory and trial delivery of the highway verge management biomass collection and biodiversity optimisation, establishing new processes and guidance for larger scale applications. Ensure that the trials are compliant with the Highways Act 1980 section 41, environmental guidance and current requirements.
- **Biomass processing:** Manage and oversee the investigatory and trial delivery of the Biomass techniques for processing including Anaerobic digestion, Hydrothermal Carbonisation, Pyrolysis, and a combination of methods.
- **Biomass applications:** Manage and oversee the investigatory and trial delivery of the Biomass applications including Power, Biofuel, Digestate Fertiliser, Biochar and Hydrochar.
- **Strategic 'Greenprint' outputs:** Compile the various information and outcomes and produce a comprehensive Circular Economic System report, a 'Greenprint' management model (how to), and business case that can be packaged with carbon model and shared with other authorities.



- **Communications:** Share and promote Greenprint progress and news through multiple channels and formats to key influencers and stakeholders across the highways sector and beyond, while engaging with communities who will see a dramatic change in the appearance of their verges.
- **Corporate functions:** Expenses associated with legal activities, finance activities and contractual agreements including procurement.

The cost breakdown, exclusive of any risk allowance, for the project is presented in Table 9.

Workstream Item	Cost
Outline Business Case	£40,000
PMO and project management	£420,000
Strategic carbon analytics	£400,000
Verge management	£1,994,818
Biomass processing	£320,000
Biomass applications	£105,000
Strategic 'Greenprint' outputs	£225,000
Communications	£270,000
Corporate functions	£60,000
<b>TOTAL</b>	<b>£3,834,818</b>

Table 9: Greenprint workstream base cost

Key assumptions made when obtaining estimations of project costs:

- Project start in April of 2023 and expected completion in 2025 (with a subsequent 5-year monitoring and evaluation stage).
- Project costs are prepared in Q1 2023 prices.
- Inflation rate applied based on CPI at 4% per year.
- Project Manager (PM) lead for each council and an overall PM project partner.
- Verge management activities are based on historical weather and seasonal patterns in the trial areas.
- Carbon model is confined to the boundaries of the trials only.

### Risk Adjusted Costs

At OBC phase, discovery and developmental efforts are necessary to gain an increased level of estimating accuracy. It's crucial to acknowledge that there's ambiguity in the estimation and assumptions on which the costs are grounded. Innovation projects involve exploring new ideas and technologies, which can be inherently uncertain and difficult to define. Consequently, a 5% risk contingency is included in the total costs to account for this uncertainty.

The cost breakdown, including risk allowance, for the project is presented in Table 10.

Workstream Item	Contingency Adjusted Cost
Outline Business Case	£40,000
PMO and project management	£441,000
Strategic carbon analytics	£420,000



Verge management	£2,097,065
Biomass processing	£336,000
Biomass applications	£110,250
Strategic 'Greenprint' Outputs	£236,250
Communications	£283,500
Corporate Functions	£63,000
<b>TOTAL inc. risk</b>	<b>£4,027,065</b>

Table 10: Greenprint workstream risk adjusted cost

Appendix B contains the first draft of what will be an active risk register, which will be used as a risk management tool throughout the lifecycle of the project. It will help to identify potential risks and develop strategies to mitigate them. It will be continuously monitored throughout the project and updated as necessary to reflect any changes in the risk environment.

## Spend Profile

Table 11 indicates the annual spend profile for Greenprint.

Project Cost	Costs to April 2023	2023	2024	2025
<b>Annual Cost</b>	£40,000	£1,566,019	£1,170,126	£1,250,920
<b>Cumulative Total</b>	£40,000	£1,606,019	£2,776,145	£4,027,065

Table 11: Greenprint spend profile

A combination of top down and bottom-up estimating has been used to calculate the costs for the project. Top-down estimating has been used to understand the overall estimate for the size of the project at each stage of the LL2 process. A bottom-up approach has been used to refine these estimates, particularly in the Verge management and Biomass processing workstreams, and validate the project cost.

## 5.3. Programme Funding

Funding for the Greenprint project is intended to be sourced through the ADEPT LL2. ADEPT LL2 is a three-year, £30million, UK-wide programme funded by the Department for Transport that will run until March 2026, concentrating on how to decarbonise local highways infrastructure and assets.

### Expected Funding Profile

Funding Source	Funding to April 2023	2023	2024	2025
<b>ADEPT LL2</b>	£40,000	£1,594,826	£1,196,120	£1,196,199
<b>Cumulative Total</b>	£40,000	£1,634,826	£2,830,946	£4,027,065

Table 12: Greenprint funding profile

### Additional Funding

This section identifies additional funding, leverage against existing programmes, private sector and other funding including contributions in kind. SGC and WSCC are investing heavily in decarbonising





their estates and activities to achieve net zero by 2030, including £25million allocated for capital investment in low carbon energy projects, some of which will be used to invest in the technologies being trialled in this project if the outcomes can be successfully achieved.

In addition to the work programmes identified below, both councils will also provide in kind contribution of capacity, expertise and oversight to the project including Highways Managers, Grounds Managers, Climate and Nature Emergency Leads and Asset Data Management Officers.

**SGC** has recently completed an ambitious 1 year £350K Community Renewals Fund funded project for a verge management programme and has also secured £100K from the Environment Agency Natural Environment Investment Readiness Fund (NEIRF) for an innovation project commencing in December 2022. The projects have funded machinery for pilot work and will help to further inform and complement Greenprint to optimise carbon metric tools and application alongside other environmental and social capital benefits including the potential to draw in funding through sale of Biodiversity Net Gain credits and the inseting of the Council’s residual carbon emissions against estimated sequestered carbon.

**WSCC** is undertaking a three-year project with South Downs National Park to understand how altering management regimes and collecting cut biomass impacts growth rates and biodiversity of road verges. The study began in 2021 and is due to complete in 2023. It covers 13 verges totalling 30,000m<sup>2</sup> with varied soil types and habitats. WSCC has invested in new technology to collect the cut biomass, which is then composted. Environmental consultants have been contracted to monitor the impact on biodiversity. Initial findings indicate that rare habitats are present in road verges in West Sussex and that they could benefit from the cut and collect process. This project can be leveraged in Greenprint and has been very useful for testing the technology and logistics for cut and collect, and has also highlighted the impact that variable and extreme weather patterns have on growth rates and cutting yields.

**Ricardo.** This Live Lab will complement their advisory to the UK Government on the potential of bioenergy with carbon capture in the UK. Furthermore, secured £3 million funding from BEIS' Net Zero Innovation Portfolio to research carbon capture and storage technology with pyrolysis.

**Plantlife International.** As a key innovation partner, they will provide guidance on the highway verge management and species-rich grassland management. This Live Lab will complement the Driving Systemic Change on Britain’s Road Verge Management - a £443k programme of work over 3 years across England, Scotland and Wales, and the IMD MBA International Consulting Project - to consider how public sector infrastructure could be re-imagined as a nature-based solution.

**Amey.** Amey will provide Senior Director guidance, management frameworks, access to materials labs and leverage against existing SME accelerator programmes to identify and develop leading SMEs. Amey will also provide carbon training for all those involved on the project across each organisation to ensure each partner works to a common set of standards.

The amount of additional funding is shown in Table 13.

Organisation	Additional Funding/Leverage
<b>SGC</b>	£520,000 - £650,000
<b>WSCC</b>	£200,000 – £400,000, with further capital investment available
<b>Plantlife International</b>	£100,000



<b>Ricardo</b>	£50,000
<b>Amey</b>	£150,000 - £300,000

Table 13: Additional Funding, leverage against existing programmes, private sector, and other funding including contributions in kind

## 5.4. Financial Responsibility

SGC and WSCC have drafted an Accountable Body Agreement which sets out the agreement between the two parties for the purpose of managing, commissioning and delivering the project within their respective administrative boundaries and maintaining the project resources for the management, commissioning and delivery of the project. The acceptance of financial responsibility, including the arrangements for the project funding, are found in this partnership agreement.

SGC shall act as the project accountable body to receive grant funding and manage distribution of payments to deliver against agreed project costs.

Section 151 officer sign off for the project is located in the Commercial Case, Section 4.4.

## 5.5. Financial Viability

The project will prove demonstrable benefits directly related to the operating models of LHAs across the UK. The purpose of this Live Lab is to create a carbon-negative systems model that will continue to influence change in green infrastructure management after the LL2 funding has ended. The strategic outputs workstream will produce a “Greenprint” for effective management and maintenance of the estate that comprises learning from across the project, including a business case which will set out the financial viability of using Greenprint in an authority. The business case will not be owned by any private entity and will be open and accessible for all. As SGC and WSCC are trialling different commercial arrangements across the workstreams of the project, the business case produced will include options based on the level of CapEx (e.g. plant and equipment, processing units) , OpEx (e.g. operational payroll) and will set out the desired benefits and return on investment. This business case will be used by SGC and WSCC to sustain the scheme beyond the life span of the project and shared with other authorities so that the model can be scaled across the UK.



## 6. The Management Case

### 6.1. Approach

The DfT’s and ADEPT’s guidance document ‘OBC Guidance v1’, outlines the criteria that should be covered as part of the Management Case for LL2. Table 14 shows where the relevant information, in accordance with the requirements can be found in subsequent sections.

Content	ADEPT & DfT Requirements	OBC section
<b>Organisation</b>	A diagram illustrating the organisation structure with key roles and responsibilities that will be in place to provide controlled and informed decision making	6.2
<b>Governance</b>	Any reporting arrangements to provide key updates on progress and how these mesh with the Live Labs programme cadence	6.3
<b>Roadmap</b>	A high level roadmap with phasing of scope across the Greenprint lifecycle.	6.4
<b>Support Statements</b>	A clear statement of senior level support from any partner organisations	6.5
<b>Project Plan</b>	A project plan that will be used to track the progress and delivery of the project and its resulting outcomes	6.6, Appendix A
<b>Risk Register</b>	A first draft of what will be an active risk register	6.7, Appendix B

Table 14: ADEPT & DfT requirements for the Management Case

### 6.2. Greenprint Organisation

This section sets out the key roles and responsibilities that will be in place to provide controlled and informed decision making.

The Greenprint Programme is a collaboration between SGC and WSCC to optimise the management of their respective green estates so as achieve de-carbonisation and bio-diversity targets a set out in the Strategic and Carbon Cases.

SGC and WSCC have identified technical and academic consultants to drive innovation and a programme partner to maintain integration, control and benefits focus. These parties all work as a collaborative within a loose framework allowing agility whilst managing contract scope.

SGC is acting as the prime and will receive and manage the project funding from SGC therefore will lead on the reporting and engagement to ADEPT Commissioning Board in behalf of Greenprint.

As the recipient of the funds SGC will also be the contracting party with the third party Technical Consultants and the Programme Partner will define the scope and deliverables via the contracts.

With regards to the day to day delivery of scope, communication and task management there are some shared roles such as the of Technical Consultants and Programme Partner for whom both SGC and WSCC have equal responsibility respective to the work packages. There are then project resources, SMEs and supply chain and maintains accountability for scope and line management. The solid lines indicate the contractual relationships and the dotted lines indicate task management only.

A high level description of the key roles, lines of accountability, how they are resourced and the Senior Responsible Officer is set out in Figure 10.

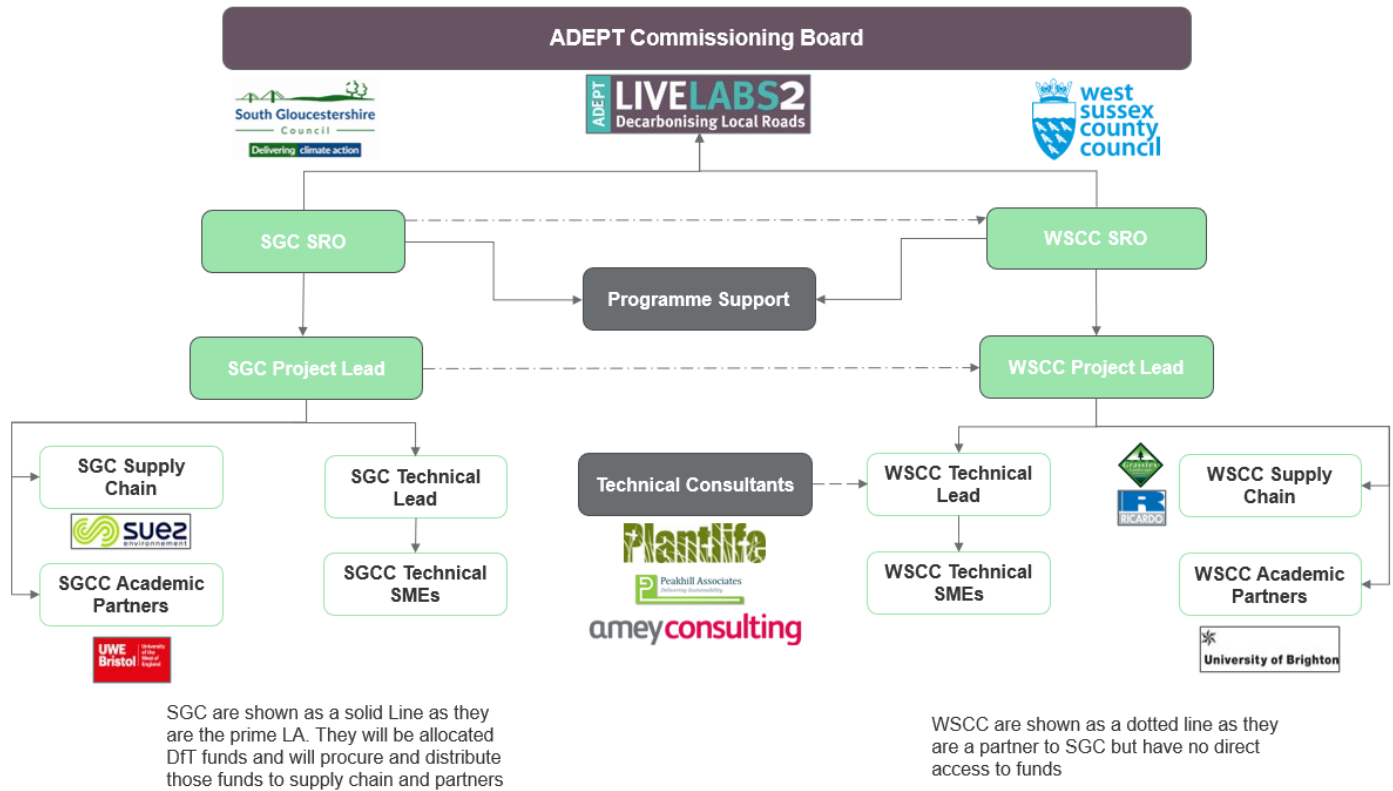


Figure 10: Greenprint organisational structure

Within the Greenprint organisation the roles and responsibilities for the key resources on the organisation chart are set in the table (Figure 11) below against Key Performance Indicators regarding baseline management (time, cost, scope) and benefits (Carbon, Value, Innovation, System Integration and Knowledge Sharing). SGC and WSCC have both appointed a Senior Responsible Officer who maintain accountability for all deliverables and benefits. The SROs have delegated responsibility for technical matters to the technical leads and project mechanics to the project leads within their direct organisation. In turn some of the responsibility has been shared with the technical consultants and programme partner.

	Scope	Cost	Time	Carbon Measurement	Innovation	Value	Integration & Controls	Knowledge Sharing
	Define and deliver scope	Define and manage cost	Define and manage schedule	Define approach and measure	Identify and measure	Identify and measure	Define and implement	Define and implement
SRO ( Local Authority SGC & WSCC)	A	A	A	A	A	A	A	A
Technical Lead ( Local Authority SGC & WSCC)	R	C	C	R	R	R	C	C
Project Lead ( Local Authority SGC & WSCC)	R	R	R	I	I	I	C	R
Technical Consultants	C	C	C	R	R	R	I	C
Carbon Measurement	C	C	C	R	C	C	I	C
Supply Chain	C	C	C	C	C	C	I	C
Academic Research	C	N/A	I	C	C	C	N/A	C
Programme Partner	R	R	R	I	R	R	R	R
ADEPT Commissioning Board	I	I	I	I	I	I	I	I
Monitoring & Evaluation Programme	I	I	I	I	I	I	I	I

Figure 11: Greenprint organisational roles and responsibilities



## 6.3. Governance

This section sets out oversight and reporting arrangements to provide key updates on progress and how these align with the LL2 programme cadence. The approach to achieving innovation through agile delivery is also described.

Figure 12 indicates agile delivery governance centred around outcome-based sprints with scope and assurance provided via Steering Groups with three lens: Lens 1 Integration of people, process and technology ; Lens 2 Technology outcomes; and Lens 3 People and process outcomes.

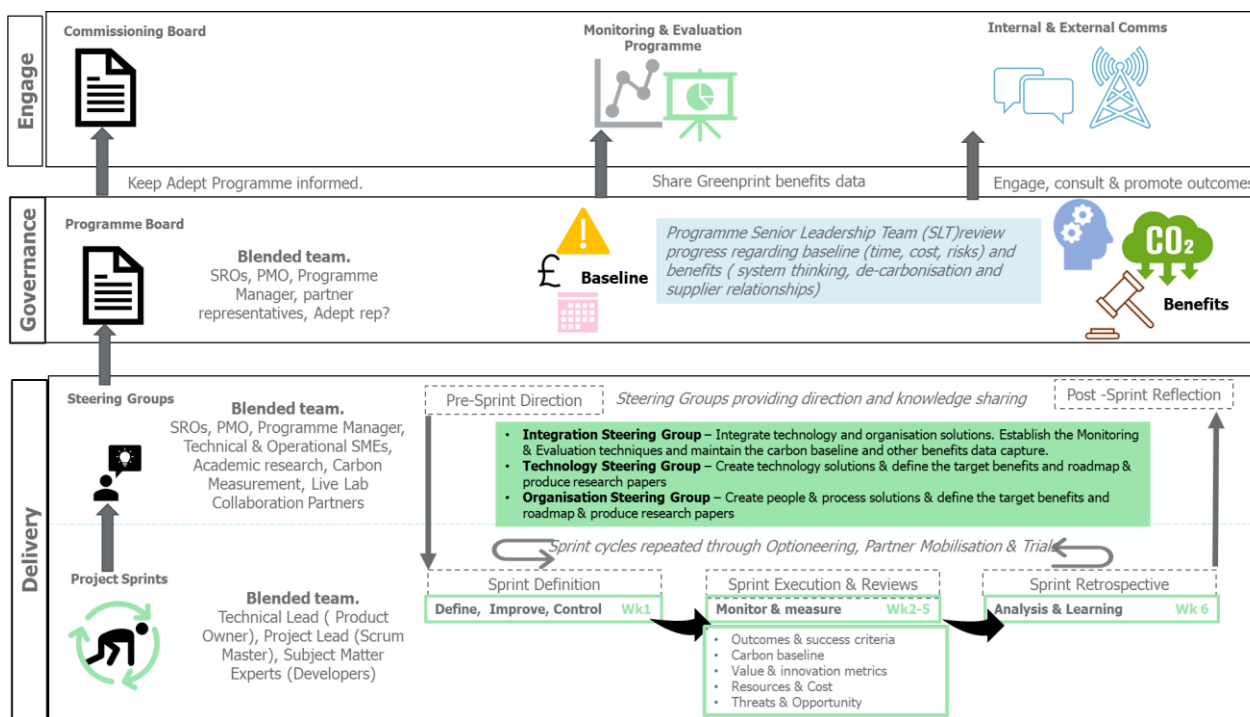


Figure 12: Greenprint governance model

The delivery workstream applies an agile focussed governance model and cadence to keep track of decisions, changes and benefits and to provide timely insight and direction. The standard Sprint cycle is applied however the durations will be variable more likely months than weeks. The Sprint cycle remains characterised by the three stages of Definition, Execution & (Iterative) Review, Retrospective (evolve and embed) and are book ended by a pre-Sprint definition and post- Sprint reflection Steering Group to provide direction and knowledge sharing.

Above the Agile Delivery Governance is the more traditional governance centred on baseline management with reporting against time, cost, risk and benefits. This will align to ADEPT LL2 review cycles and the Monitoring and Evaluation process.

The combination of speed and innovation balanced with complex and vast stakeholders requires a hybrid governance framework that provides confidence, clarity and collaboration.

## 6.4. Greenprint Roadmap

The section below sets out the high level Greenprint roadmap indicating the phasing of the scope and iterative maturity of the solutions developed via agile delivery. A Greenprint scope boundary has been set out in Figure 13 across five key workstreams: Strategic Carbon Analytics, Verge





Management, Biomass processing, Biomass applications and Strategic 'Greenprint' outputs. High level proposals are made all of which require feasibility, partner selection and benefits capture.

Strategic Carbon Analytics	Verge Management	Biomass Processing	Biomass Applications	Strategic 'Greenprint' Outputs
<b>Highway carbon emissions</b> Leveraging the data from carbon calculators, this workstream will construct predictive analytics overlay on top of the existing Future Highways Research Group Tool to compare and contrast	<b>Verge emissions analysis</b> Develop and test a methodology for monitoring, reporting and verification of carbon emissions from verge management	<b>Anaerobic Digestion</b> Model mix of verge biomass and timing of harvests to optimise AD scale, feedstock mix and outputs identifying value, size and usability of output, alongside lifecycle carbon emissions  OUTPUT: BIOFUEL	<b>Heat and power</b> Use of AD and pyrolysis plant as a source of heat, power and flexibility for buildings or processes e.g. Local plant or buildings, Connecting to the grid, EV Charging (incl mowers and harvesting equip)	<b>Systems blueprint</b> Mapping a circular economy system for repetition in further authorities
<b>Fugitive emissions model</b> Model and assess levels of fugitive emissions; identify sites with high emissions; develop tools for replications	<b>Biodiversity optimisation</b> Demonstrate how enhanced management drives improvements in verge biodiversity which feed into local green infrastructure strategies and Local Nature Recovery Strategies. Identify and monitor sites of biodiversity interest that need sympathetic management and adjusting harvesting schedules to match	<b>Pyrolysis</b> Model mix of verge biomass and timing of harvests to optimise pyrolyzer scale, feedstock mix and outputs identifying value, size and usability of output, alongside lifecycle carbon emissions  OUTPUT: BIOCHAR	<b>Biofuel</b> Investigate potential for purifying and liquifying biogas to produce biomethane for transport fuel. Test and develop modification kits to convert fossil fuel engines to run on biomethane.	<b>Business case for scale</b> Constructing a validated and detailed business case for investment into Live Lab technology
	<b>Cut and collect technology</b> Model and test a range of technologies for cutting, collecting and transporting verge biomass	<b>Hydrothermal Carbonisation</b> Enables both wet and dry biomass input within high-tech, high temperature process. Analyse outputs identifying value, size and usability of output, alongside lifecycle carbon emissions  OUTPUT: HYDROCHAR	<b>Biochar asphalt additive</b> Investigate potential for biochar products to be used to reduce lifetime costs and carbon emission of highways infrastructure, as a fertiliser or as a livestock food additive	<b>Scale in lab</b> Model testing on five further authorities DURING the Live Lab programme to test assumptions in different environments
	<b>Cut and collect logistics</b> Model cut and collect logistics and develop tools for replication. To include urban and rural settings, collection capacity, logistics for use and storage, lifespan costs, fuel consumption and carbon emissions.	<b>Combined mechanisms</b> Investigate technologies for and benefits of combined Pyrolysis and Anaerobic Digestion processes	<b>Digestate fertiliser</b> Investigate role of digestate as fertiliser to replace synthetic fertilisers and peat compost. Could also consider potential feedstock for Energy from Waste plants	<b>Knowledge sharing</b> Alongside partners, develop tools and approaches to ensure that learning is distributed and socialised to maximise impact
	<b>Verge litter</b> Consider impact of verge litter and how to remove it: current processes for collection, technology for removal and separation, designation as waste stream, implication for licensing and transport and downstream processing		<b>Hydrochar asphalt additive</b> Investigate potential for biochar products to be used to reduce lifetime costs and carbon emissions of highways infrastructure, as a fertiliser, or as a livestock food additive	

Figure 13: Greenprint scope boundary

The intention, as set out in Figure 14, is to deploy phased trials of Verge Management, Bio Mass processing and Bio-mass application across the three harvests (May to September) embedding learning each cycle.

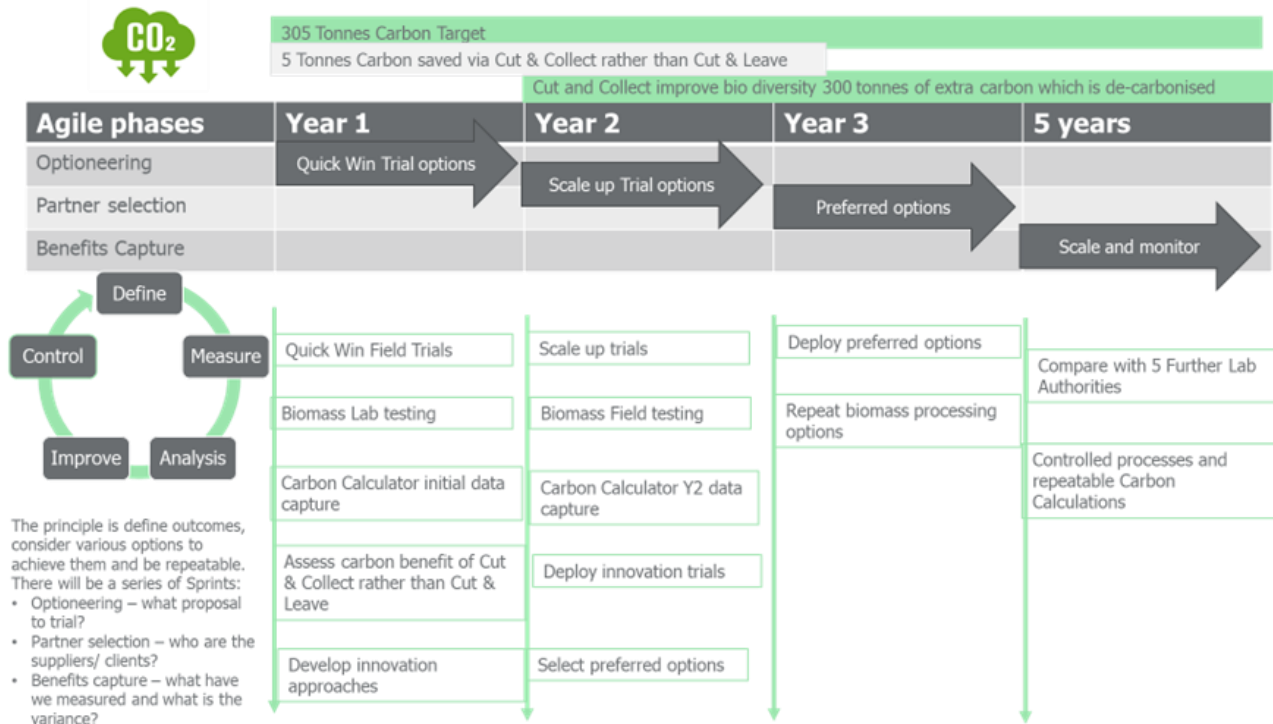


Figure 14: Greenprint management roadmap



There will be parallel workstreams deploying existing quick win technology via field trials whilst other innovations will be explored with a lab. The combined expertise and knowledge of the technical and academic partners is key to ideas/options generation. There are three distinct workstreams: Delivery (the doing), Governance (the doing it right) and Engagement (informing and working with stakeholders).

In order to deliver innovation whilst achieving progress, the proposal is to run a series of outcome focussed sprints, albeit longer durations than your typical development sprint. This will run through three phases: Optioneering (what proposal shall the project trial?) Partner Selection (who are the suppliers and clients?) and Benefits Capture (what have the project measured and what is the variance?). There will be field tests and lab testing happening in parallel and the typical scrum methodology shall be applied to provide clarity to the developers and use daily stand ups to keep stakeholders engaged. The Continuous Improvement or Lean6Sigma approach of Define, Measure, Analysis, Improve, Control (DMAIC cycle) will be key to establishing results quickly and adapt accordingly so as to achieve the benefits.

## 6.5. Senior level supporting statements from any partner organisations

 **Amey Consulting:**  
Alex Gilbert – Managing Director

*“At Amey we recognise there is a need to manage the highway network differently. The Sector must embrace new innovative solutions, in order to see a step change in the approach to decarbonisation. Our new Owners have made decarbonisation a core business priority and are committed to support our customers reach their Net Zero Goals. We are excited to be a part of such an interesting innovation, working alongside forward thinking organisations & partners. I wholeheartedly endorse this project and look forward to working with a fantastic team to drive change in the sector.”*

 **Plantlife International:**  
Nicola Hutchinson, Director of Conservation

*“Plantlife International sees this collaboration as an essential step towards achieving the systemic change in green infrastructure management that our biodiversity and carbon targets need. We see vegetation management and biomass utilisation as fundamental to delivering nature-based solutions for climate and biodiversity, among other ecosystem services, in an economically sustainable way as part of a more bio-based circular economy. This will help to deliver towards the targets of the Environmental Improvement Plan (EIP) 2023; to the standards of the Green Infrastructure Framework and to enable local highways authorities and service providers to achieve carbon targets and meet their Biodiversity Duties.”*

 **Peakhill Associates Ltd:**  
Dr Nick. J. Cheffins, Managing Director

*“One of the objectives of ‘Greenprint’ is to transform the status for biomass drawn from both councils’ highways estates from ‘waste’ to ‘value’ and prove a sustainable model and business case for highways and biomass organisations to work together synergistically to achieve radical reductions in overall carbon emissions. Peakhill Associates has been pleased to play a small role within Greenprint’s development and stands willing to continue to support it going forward.”*

## 6.6. Project Plan

See Appendix A for a draft of the project plan.

## 6.7. Risk Register

See Appendix B for a draft of an active risk register.



## 7. The Carbon Case (5 sides of A4)

The DfT’s and ADEPT’s guidance document ‘OBC Guidance v1’, outlines the criteria that should be covered as part of the Carbon Case for LL2. Table 15 shows where the relevant information, in accordance with the requirements can be found in subsequent sections.

Content	ADEPT & DfT Requirements	OBC section
<b>Carbon Baseline</b>	Description of a carbon baseline estimation and reduction target relative to that.	7.2
<b>Carbon Benefits</b>	Description of your expected carbon benefits / reductions broken down by intervention type and cross referencing to estimated whole life cost per tonne and categorised	7.2
<b>Carbon Measurement</b>	Description of your approach to carbon measurement across the lifecycle including details of proposed tools, methodologies and source data	7.2, 7.5
<b>Residual Emissions</b>	Description of your approach to the quantification of residual emissions that cannot be cut (i.e. unavoidable emissions).	7.3
<b>Academic Partners</b>	Details of any academic or industrial partners who may be assisting in this process, their roles and commitment.	7.4

Table 15: ADEPT & DfT requirements for the Carbon Case

### 7.1. Understanding Carbon

The programme will use the full range and tools offered by the FHRG to assess and baseline the interventions on the live lab programme, in addition, the project will also take additional steps, including:

- Behaviour, Culture, Training, Understanding** – The project will work with both authorities to undertake workshops to understand the current state of play in local authorities with regards to understanding of the carbon challenge and the changes that need to be made to support decarbonisation. A programme that transforms each layer of the organisation will be fundamental to the programme’s legacy.
- Data** – The project will confirm what data is required in order to baseline and continually monitor and measure carbon following identification in **Error! Reference source not found.** Following this it will provide a funded data collection programme to collect the missing data sets required, and feedback to the FHRG CCAS.
- Process Mapping** – Building upon the initial analysis and to fully understand the carbon emissions from lifecycle planning the project will produce a detailed process map so that it can identify where in the process has the largest carbon emissions and therefore what areas need to be focused on for carbon reduction.
- Quality Assurance** – Carbon baselining and ongoing measurement is a new process that all local authorities are starting to undertake. For this reason, it is important to implement a quality assurance process so that confidence exists in and that processes and tool are accurate for uses with both SGC and WSCC. The Project will then be able to demonstrate to others that the Project Carbon Framework can deliver the required reporting. The Project Carbon Challenge process includes reviews of the following:
  - Reuse and retrofit Minimise
  - Operational energy & water use
  - Use of recycled materials
  - Regenerative design
  - Materials selection
  - Designing for durability and flexibility

### 7.2. Carbon Baseline

In the first year it is anticipated that the project will focus on operational changes to verge management. This is because the seasonal variation in growth rates provides an opportunity to trial these measures in advance of the technical solutions to process verge biomass. From Year 2 onwards collected materials will be processed to convert verge biomass to produce a range of outputs. The baseline will be quantified in such a way as to make it possible to ensure flexibility in the data



such that the changes in Year 2 onwards can be suitably investigated. For example, separating fuel required for transport from that used in the process given that from Year 2 transportation will increase. Baseline and changes in soil carbon will also be monitored across the project.

## Baseline Year 1

As a result of the seasonal nature of verge management it is anticipated that quantification of the baseline will take place over the first year of the project. Additionally, this period will be used to set up the processes and systems required to collate information and process it such that carbon progress can be effectively monitored.

- Fuel consumption required for transport vehicles sourced from the Local Authorities and their contractors.
- Fuel consumption required for cutting process sourced from the Local Authorities and their contractors.
- Carbon sequestered into the soil under the current maintenance regimes estimated in the trial areas using available academic literature.
- Current estimated carbon emissions under the existing SGC trial area maintenance regime.
- Current estimated carbon emissions under the existing WSCC trial area maintenance regime.

The Project has set targets for reduction in carbon emissions as follows:

- Scope 2 and 3 emissions: optimisation of mowing cycles will reduce scope 2 and 3 emissions from green estate management by 20%.
- Lower carbon fuels: biogas and biomethane from green estate. The technology for achieving this is proven in a variety of laboratory contexts, with this now the perfect time to build an operational system to achieve these goals.
- Asphalt additive: Biochar-modified asphalt binder as an additive into asphalt production has consistently demonstrated a 35% increase in deformation resistance within a laboratory and operational context. The key now, is to create an operational mechanism for LHAs to operationalise their own waste assets. Forecasting suggests a reduction in carbon from maintenance requirements anywhere from 10-25% due to increased durability of the roads.
- Fugitive emissions: Fugitive emissions are still predominately 'ghost' emissions, with little understanding of their scope and impact. This project will map these emissions in detail and aim to significantly reduce them through adoption of methods designed to use the arisings. Effectively, the impact of converting biomass into useful products has a double effect on carbon, as it removes original atmospheric carbon released when the arisings are left in situ.

The Project will also track increase in soil carbon sequestration as a result of changes to highway verge management through implementing 'cut and collect'.

## Baseline Year 2 Onwards

In addition to those elements in Year 1 requiring analysis, the added complexity of the collection of cuttings and transport to processing facilities requires additional investigation. Specifically in the South Gloucestershire trial, an existing anaerobic digestion plant is to be utilised. The carbon benefit of utilising verge cuttings to generate gas is therefore a net change relative to current performance of the facility and dependent on variables known by the operator. Baselineing the carbon emissions associated with the project is therefore a function of the changing output from the facility and its investigation forms part of the output of this project.

Additional variables associated with collection and processing of cuttings are currently zero given that they are left on the verge to decompose.

An evaluation and monitoring plan will be prepared in the planning stage of the project which will set out how data will be collected to inform the project baseline, to set SMART project outcomes and track progress on project delivery including agreed review points, interim and final findings. The





project plan and timeframe for data collection and reporting of monitoring and evaluation findings will align with LL2 reporting requirements and be subject to internal checks and scrutiny by the SGC and WSCC steering groups and overall Programme Board. Data collection methodology will also be informed by the work of academic, research and industry partners involved across the project to assess key components.

In doing so, this Live Lab will use the Future Highways Research Groups Carbon Calculation & Accounting Standards (FHRG), a step-by-step guidance to assist Local Highways Authorities (LHA) in implementing the GHG (greenhouse gas) protocols for measuring and reporting carbon emissions.

The partnership with the FHRG will include but not limited to the following:

- Access to the pre-release Carbon Calculation & Accounting Standards (CCAS) documents o Including the methods statements and carbon profiles library.
  - An independently assessed baseline carbon footprint assessment
  - Implementation of an enhanced version of the Carbon Analyser desktop application
- With access to the Carbon Analyser throughout the life of the LL2 programme
- Licenses for the FHRG Carbon Dataverse, to supporting programme carbon modelling.
- Assistance in the creation of a Live Labs II: Experimental Carbon Profile(s) for the Live Labs project
- Independent certification of each experimental profile's veracity, accuracy, and completeness
- Annual, independent carbon footprint waypoint assessments
- An end-of-programme carbon savings statement.
- Dissemination and peer review within the FHRG community.

In addition, lifecycle assessment will be undertaken using OneClick LCA. This tool is a de-facto industry standard for Whole Life Carbon analysis. Its use will not only benefit the project but will also enable comparative analysis to be undertaken with the FHRG CCAS.

This project will aim to:

1. Set a transversal and replicable methodology to collect data and measure carbon emissions.
2. Create and consolidate a baseline of current carbon emissions.
3. Map and identify fugitive emissions.
4. Track and record carbon emission during the lifecycle of the project.
5. Secure a long-standing methodology.

A monitoring plan will identify and mitigate potential fugitive emissions across the lifecycle of the project. Each activity, from the initial highways maintenance and including the transportation, handling, storage and processing of all input and output materials, will be regulated, and recorded within the plan and specific action taken to minimise the overall environmental impact of these solutions. The monitoring plan shall outline the risks associated with each activity for expected and worst-case scenario events before aligning these with suitable protocols and control measures to manage these risks. Regular and ongoing review procedures shall ensure the efficacy of the protocols is maintained.

### **Capital Carbon**

Capital Carbon associated with the project is anticipated to arise primarily from:

1. Operational equipment procured. Specifications to be obtained from the Contactors with emissions factors from industry standard.
2. Embodied carbon and carbon required for installation etc. associated with measures yet to be specified in detail such as use of biochar in asphalt. Information to be gathered from existing standard emissions factors.





## Operational

1. Fuel consumption required for transport vehicles sourced from the Local Authorities and their contractors.
2. Fuel consumption required for cutting process sourced from the Local Authorities and their contractors.
3. Carbon sequestered into the soil under the current maintenance regime estimated in the trial areas using available academic literature. Biodiversity to be directly monitored and ongoing sequestration to be obtained via specialists.
4. Carbon emissions and gas produced will be obtained from the operators of the equipment.

## End of life

1. Operational equipment procured. Specifications to be obtained from the Contractors with emissions factors from industry standard.
2. Waste arising and capital carbon associated with decommissioning to be estimated from information obtained from the Contractors and standardised industry data.

## 7.3. Approach to the Quantification of Unavoidable Emissions

As previously discussed, baseline emissions are calculated as the total emissions within the scope of the project. i.e. the sum of Capital, Operational and End of Life emissions associated with:

- Carbon sequestration and fugitive emissions associated with current verge management
- Road transport
- Operation of plant and equipment
- Net operational variation in carbon emissions associated with the production and potential use of bio-gas
- Capital carbon associated with plant and equipment
- Capital carbon associated with materials that may be offset by biochar

The project will monitor carbon savings associated with the proposed interventions to management practices and processing of verge cuttings.

- Residual emissions will be calculated by taking monitored emissions associated with these interventions from the baseline.

Significant changes to the elements making up the baseline will be incorporated in a process of updating the baseline emissions on a regular basis such that any impact on the project can be addressed.

## 7.4. Academic / Industrial Partners

Partners will be selected on the basis of expertise and value to the specific workstreams and trials throughout the projects.

Core academic and industrial partners who will be involved in supporting carbon monitoring, measurement and reduction include:

- |  |   |
|--|---|
| - Peakhill Associates/Dr Nick Cheffins | - University of Leeds Engineering schools |
| - Plantlife International              | - University of West England              |
| - Amey Consulting                      | - University of Brighton                  |

## 7.5. Data Management and Sources

Within the first month of the project a data management plan will be prepared. This will identify the key stakeholders and resources to be used to work with the data to monitor carbon emissions and prepare suitable reporting. This will include confirmation of personnel to be tasked with:

- Managing the process;
- Implementing and operating systems to obtain data;
- Preparation of regular progress updates and annual reporting as required.

Data will be held on a project SharePoint site for ease of access and regular update. Table 16 identifies potential sources of information that will be used to either baseline or monitor carbon performance. Whilst it is anticipated that in the process of starting the project additional and/or



alternative sources may be identified it is considered that this table will form the core of the data gathered.

Element	Identified Potential Data Sources	
<b>Verge Maintenance</b>		
Transport of additional equipment to site	Diesel and petrol consumption of vehicles.	
	Electricity consumption for EV / plug in hybrid vehicles.	
	Fuel delivered from bunker storage.	
	Fuel card data.	
	Vehicle mileage using GPS data.	
Fuel use in the plant and equipment used to maintain verges	UK Government Reporting Emissions factors for vehicles and liquid fuels.	
	Fuel purchased or delivered from bunker storage. 2 stroke oil either from procurement/supply data or based on 50:1 ratio.	
Carbon sequestration as a result of the existing maintenance regime	The balance of carbon sequestration vs any potential emissions will be investigated and quantified through specialist academic research following the start of the project.	
Any greenhouse emissions resulting from decomposition of vegetation as a result of the existing maintenance regime		
<b>Transport to Processing Facility</b>		
Energy required to transport grass cuttings to AD plant	Diesel and petrol consumption of vehicles.	
	Electricity consumption for EV / plug in hybrid vehicles.	
	Fuel delivered from bunker storage.	
	Fuel card data.	
	Vehicle mileage using GPS data.	
<b>Material Processing and Waste</b>	UK Government Reporting Emissions factors for vehicles and liquid fuels.	
	Energy required to initiate and maintain processing of material in the plant	Electricity or fuel consumption sourced either from Contactor or from Council Operator.
	Gas generation by processing the verge material	This will be estimated by the operator in the case of the South Gloucestershire proposal as co-mingling with other commercial waste streams in a large facility will introduce complexity.
		It is anticipated that more control of data associated with the West Sussex solution, utilising as it does a dedicated piece of equipment will be simpler to obtain quantified information from. Data will be provided by the Operator from metering.
	Disposal of waste digestate material	Quantification will be provided by the operators of the plant with emissions factors from UK GHG Reporting data.
Capital carbon	Embodied carbon emissions associated with new equipment purchased for the purposes of this project will be estimated using data sourced from databases within the commercially available software.	
<b>Use of Biochar</b>		
Collection and processing at the facility.	Energy consumption of any processing that may be required to make the biochar suitable for use – i.e. grading it into suitably sized pieces.	
Transport to point of use	Diesel and petrol consumption of vehicles.	
Capital carbon in conventional asphalt	Available in commercial software and from the future highways research group.	

Table 16: Identified potential carbon data sources



## 8. Equality Impact Assessment (2 sides of A4)

### 8.1. Approach

The DfT’s and ADEPT’s guidance document ‘OBC Guidance v1’, outlines the criteria that should be covered as part of the Equality Impact Assessment for LL2. Table 17 shows where the relevant information, in accordance with the requirements can be found in subsequent sections that make up the Equality Impact Assessment.

Content	ADEPT & DfT Requirements	OBC section
<b>EDI</b>	An Equality Impact Assessment to highlight (as defined by s149 Public Sector Equality Duty – Equality Act 2010) how people with protected characteristics will benefit from proposals and how they will ensure that any possible negative impacts are mitigated early on	8.2, 8.3
<b>Engagement</b>	We expect engagement with relevant stakeholders who represent people from the protected characteristic groups	8.2, 8.3
<b>Stakeholders</b>	Stakeholders to be consulted; relevant research/data; potential positive equality impacts; potential negative equality impacts; mitigations to negative impacts; and how the impact on equality will be monitored throughout the lifetime of the proposal	8.2, 8.3

Table 17: ADEPT & DfT requirements for the Equality Impact Assessment

### 8.2. Highways users

Both authorities value, celebrate and embrace Equality, Diversity, and Inclusion (EDI) and taking action to reduce inequality, ensure equality of opportunity, value diversity and eliminate unlawful discrimination is an overarching priority across the SGC Council Plan 2020-2024 and WSCC Council Plan 2021-2025.

The Equalities Impact Assessment and Plan (EqIAP) which informed the SGC Community Renewals Fund verges project 2022 identified important differences in barriers, experience and participation regarding highway design and management, of people from EDI groups particularly for people with physical, sensory and motor disabilities, people who are neuro diverse and people from lower socio-economic groups due to transport cost barriers limiting their travel options often to walking or wheeling.

The aim is to deliver a Live-Lab that delivers positive outcomes for everyone in society and helps reduce inequalities, particularly for people with protected characteristics and people from low socio-economic groups. To achieve this an initial Equalities Impact Assessment and Plan (EqIAP) will be prepared through engagement with EDI stakeholder groups from SGC and WSCC in planning and all stages of the project. This will include engagement with the South Gloucestershire Equalities Forum, South Gloucestershire Disability Equality Network and Race Equality Network.

The Public Sector Equality Duty states that local authorities must, in the exercise of their functions, have due regard to the need to:

1. Eliminate discrimination, harassment, victimisation and any other conduct that is prohibited by the Equality Act 2010;
2. Advance equality of opportunity between persons who share a protected characteristic and persons who do not share it; this means:
  - Removing or minimising disadvantages suffered by persons who share a relevant protected characteristic that are connected to that characteristic.
  - Raking steps to meet the needs of persons who share a relevant protected characteristic that are different from the needs of persons who do not share it.



- Encouraging persons who share a relevant protected characteristic to participate in public life or in any other activity in which participation by such persons is disproportionately low.
3. Foster good relations between persons who share a protected characteristic and persons who do not share it; this means:
- Tackling prejudice.
  - Promoting understanding.

As a key element of meeting this Duty, the project will demonstrate it has taken into account evidence of the impact on equality in the design of policy and service delivery initiatives and what difference this has made; this means:

- Taking into account evidence of the impact on equality when proposing or consulting on a policy or initiative.
- Ensuring that evidence of the likely impact on equality affects the way in which policies and services are designed and delivered.

Overall, this means conducting effective, proportionate Equality Impact Assessment and Analysis (EqIAA). The Public Sector Equality Duty is part of The Equality Act 2010. Highways workforce and wider sector.

### 8.3. The Approach to EDI

Complementing the engagement with EDI stakeholders, the project team will create an environment which promotes equality, inclusivity, and champions diversity and equality embedded into every aspect of the programme. This is a key value driver in the success of the Live-Lab:

#### **1. Promoting and supporting a diverse and inclusive project team and supply chain.**

The project will:

- Ensure the workforce reflects the values, and is diverse in knowledge, experience and capability to ensure the perspective remains broad and inclusive
- Establish opportunities for career development and progression within the team and ensure under-represented groups are seen and heard
- Commission a positive actions programme that includes mentoring, experience days and career progression schemes

#### **2. Creating a culture of inclusivity, respect and trust**

The project will:

- Create an environment where people can work in a culture of respect and inclusion
- Have zero-tolerance towards discrimination and bullying/harassment
- Implement reverse mentoring opportunities

#### **3. Having visible and involved leadership**

The project will:

- Demonstrate the commitment to equality and diversity through visible and vocal commitments from the team
- Establish an EDI champion within the delivery and governance groups

#### **4. Establishing EDI in the practices and policies**

The project will:

- Evidence the EDI commitment within the policies and project practices
- Review the policies and practices alongside diverse groups to ensure fairness
- Establish checks and balances during the programme that will traffic light EDI
- Deliver fair and equitable recruitment into the programme
- Assess and mitigate against potential barriers for entry for underrepresented groups



## 9. Monitoring & Evaluation (5 sides of A4)

### 9.1. Approach

The DfT’s and ADEPT’s guidance document ‘OBC Guidance v1’, outlines the criteria that should be covered as part of the Monitoring & Evaluation for LL2. Table 18 shows where the relevant information, in accordance with the requirements can be found in subsequent sections.

Content	ADEPT & DfT Requirements	OBC section
<b>Overview, Strategic Monitoring, Data Capture</b>	Details of any local, tactical M&E activities related to your proposals and constituent elements, their performance and impacts These should be aside from those being undertaken at the programme level	9.2
<b>Benefits</b>	Outputs should allow others to fully understand benefits of proposals and allow them to capitalise upon them	9.3
<b>Methodologies</b>	Details of methodologies / tools to be employed and any academics / suppliers associated with the work	9.4

Table 18: ADEPT & DfT requirements for the Monitoring & Evaluation

### 9.2. Activities, Performance and Impact

#### Overview

The programme will undertake a series of strategic, tactical and local activities that are specific to the requirements of the programme and will assess the approach, outcomes and benefits of Greenprint. The activities will both directly and indirectly complement those being undertaken at the Live Labs programme level. This will enable us to verify whether the project has been successful in achieving its aims in alignment with the project’s Theory of Change model. Data collection will be conducted throughout both the three-year project duration and the five-year monitoring and evaluation period.

It is crucial that the project measures the impacts that have been defined in the Theory of Change in section 2.9. The project have grouped the impacts into the following categories:

- 1. Carbon
- 2. Sector Impact
- 3. Behavioural Change
- 4. Customer Satisfaction
- 5. Social Value
- 6. Cost
- 7. Biodiversity

**Strategic Monitoring and Evaluation Activities** to measure the impacts defined in Theory of Change include:

#### Carbon

As per section 7.3.

#### Sector Impact

Measuring the impact that Greenprint has on the sector will enable the project to be scaled both nationally and internationally. Data will be used to evaluate the effectiveness and reach of Greenprint, data gathered will include:





- Number of local authorities and suppliers who have directly engaged either in idea submission to programme outputs through the industry survey.
- Other local authorities trust in the output and outcomes from the Greenprint toolkit.
- Number of local authorities who adopt the Greenprint methodology – this could be in part or in full at the end of the initial period and after the five-year monitoring and evaluation period.
- International engagement

## Behaviour Change

Greenprint will work with behavioural change experts to monitor, evaluate and support behavioural change across three core areas.

1. Local Authority employees' attitudes towards innovation and risk, employees who are directly and indirectly involved within the programme will be invited to take part. The purpose is to assess the impact of large scale innovations programmes on the behaviour and attitudes of employees to innovation and change. In addition, to deploy measures to will help drive an innovative culture at both SGC and WSCC. This change is crucial in an industry often considered to be slow to accept and adopt change, the need to change the thinking is vital if SGC and WSCC are going to address the carbon and other crucial challenges faced across the local authority sector.
2. Local communities' attitudes towards a change in verge management to support core challenges faced by the sector including decarbonisation and biodiversity. SGC and WSCC want to assess, evaluate and advise on measures to help implement and scale change to services that will benefit communities
3. Has carbon impact has become more prominent in the decision-making process in the highways division for both SGC and WSCC.

Greenprint will deploy numerous techniques that will be identified in more detailed scoping to gather and evaluate data and make recommendations on interventions to induce change, this includes surveys, employee interviews, focus groups, measuring innovation key performance interviews and anecdotal data.

## Customer Satisfaction

SGC and WSCC will gather customer perception data and on the user experience and impact the trials and innovations have on the network.

As part of the communications strategy, SGC and WSCC will launch a campaign to inform local communities about the Greenprint project and the benefits it will bring, through social media and VMS, on any disruption and the carbon reduction initiatives that are being trialled. In the customer perception surveys and other data gathering techniques, SGC and WSCC will ask customers whether the knowledge that any disruption faced is for environmental benefits had any impact on their view and tolerance of the activity.

SGC and WSCC are hoping to understand two areas:

- Impact of the change of verge management on the customer experience.



- Whether knowledge of trials and cause of disruption impacts customer tolerance of any network disruption. SGC and WSCC hope this evidence can be used to greater inform customers of disruption, aid future support for environmental trials, both in SGC and WSCC and across the LA network.

## Social Value

- SGC and WSCC will use the TOMS framework to evaluate the social impact of alternative approaches ranging from biodiversity scores to employment and volunteering that has been generated through the new approach to working.
- The National TOMs social value proxies (the Proxy Values) are developed from adaptations of cost benefit analysis and appraisal techniques as outlined in the Treasury Green Book and other relevant public-sector guidelines (See Bibliography). In technical terms, the Proxy Values require the valuation of “non-market goods and services” and the National TOMs approach aims to be consistent with the relevant techniques outlined in these guidelines.

## Costs

Over the life of the project costs, both capital and revenue will be monitored to ensure the financial viability of the project and also to support the development of the Greenprint toolkit. The cost data will be used to compare the outputs and impart on long-term budgets, drive and evaluate efficiency and form the case of the future investment by other local authorities.

## Biodiversity

SGC have developed in collaboration with Eunomia a Natural Capital Assessment to:

- Evaluate the baseline environmental benefits delivered by a select set of verges
- Produce an Excel-based Tool to assess the potential future gains in environmental benefits that can be achieved through a change in verge management practice
- Provide recommendations for further analysis and environmental action

SGC and WSCC will use this tool to monitor carbon sequestration, air pollution removal, flood regulation and biodiversity. Greenprint will also use technical surveys outlined in the data capture below.

## Data Capture Required for Monitoring and Evaluation Activities

SGC and WSCC will collect both quantitative and qualitative data which will include but not be limited to the following:

- Review of work previously undertaken in this area. This data will be collected through a literature review and a survey that will be sent to the sector.
- Carbon footprint data in line with the Carbon Case as outlined in section 6.
- Surveys undertaken measuring biodiversity, carbon in the soil and soil organic matter.
- Public perception data: Public satisfaction / perception data will highlight any social and technical issues caused by decarbonisation.



- **Cost data:** The cost of equipment and operations of the trial process compared with the current process, cost to scale and predicted cost if trial was implemented at scale and integrated into BAU. This data will be compared to the with the whole life cost of the current local and industry standard.
- **Operational data:** SGC and WSCC will collect details of the required change to operational delivery, including verge maintenance routes, time on site, type of traffic management required, and equipment or expertise required to install and maintain the asset.
- **Behavioural change:** SGC and WSCC will conduct annual surveys of the project teams (across both local authorities) to assess changes in behaviour, attitudes towards decarbonisation, risk and innovation. SGC and WSCC will also use the NHT survey results, annual Viewpoint surveys and annual Streetcare satisfaction survey to review public satisfaction over the life of the project.
- **Social Value:** SGC and WSCC will use the TOMS framework to evaluate the social impact of alternative approaches ranging from biodiversity scores to employment and volunteering that has been generated through the new approach to working.
- **Natural Capital Assessment:** SGC and WSCC will use the natural capital assessment developed by South Gloucestershire Council to evaluate the environment benefits of the verges.
- **EDI:** SGC and WSCC will monitor the diversity of the team delivering the project throughout its duration and the diversity of people engaged through demonstrator sites as part of project specific EDI Assessments.

## Programme Level Monitoring and Evaluation

The monitoring and evaluation will focus on three key areas:

- **Impact Evaluation** – this section will evaluate whether Greenprint has delivered against the project's objectives.
- **Process Evaluation** – this section will monitor the delivery of Greenprint as an innovation project including key lessons learnt
- **Value for Money Evaluation** – throughout the project SGC and WSCC will be monitoring the costs and benefits of each workstream to ensure Greenprint is on track to deliver to time, cost and quality requirements.

These three areas will also support the overarching Live Labs programme monitoring and evaluation programme and preparation the 'Greenprint' for sharing and dissemination.

### 9.3. Outputs should allow others to fully understand benefits of proposals and allow them to capitalise upon them

The processes and outputs will be captured in a benefits tracker, with detailed explanation of the out process, rational and outcome over the three-year project. Each strategic area will also produce periodic updates, features and blogs and a final report that will be shared via the programmes communication channels and made available to the central programme.



## 9.4. Details of methodologies / tools to be employed and any academics / suppliers associated with the work

A more detailed Monitoring and Evaluation Plan will be prepared as part of the mobilisation stage of the project including baseline setting, methodologies, and measures for tracking progress. This plan will be developed working with academic partners including University of the West of England (UWE) and University of Brighton (UoB), community and EDI stakeholders, ADEPT and DfT.

Monitoring and Evaluation requirements will also be included in procurement specifications to suppliers to ensure effective, compliant and consistent Monitoring and Evaluation is delivered and captured across the project.



## 10. Sharing, dissemination and working (2 sides of A4)

### 10.1. Approach

The DfT’s and ADEPT’s guidance document ‘OBC Guidance v1’, outlines the criteria that should be covered as part of the Sharing, dissemination and working LL2. Table 19 shows where the relevant information, in accordance with the requirements can be found in subsequent sections.

Content	ADEPT & DfT Requirements	OBC section
<b>Our Approach</b>	Your proposal for continual sharing and dissemination inc white papers, blogs, thought leadership etc.	10.2
<b>Mesh with LL2</b>	Your proposals for marketing and communications activities to mesh with those at the strategic programme level including the use of local expertise	10.3
<b>Statement</b>	A statement that you will adhere to the collaborative, open and sharing spirit of LL2 and in addition what you will bring to enhance that working	10.4

Table 19: ADEPT & DfT requirements for the sharing, dissemination and working

### 10.2. Your proposal for continual sharing and dissemination inc white papers, blogs, thought leadership etc.

To optimise the strategic reach, dissemination and wider potential application of the proposed solution(s), wider partnerships including the Western Gateway which brings together councils from South Wales and the West of England, and the South-West Highway Alliance will be engaged in the next phase of developing the project. The project will build on the innovation and learnings developed through LL 1 projects and will continue to optimise links with related sector leading local and national research and funding opportunities. The approach also aims to bring benefits to the programme locally by helping us solve problems in an efficient way using experience, coordinating information so that people can find the right knowledge quickly, when they need it, and bringing team members together to engage and discuss the project. The approach is built around four core elements:

#### 1. Curating the right knowledge management items

At the beginning of the programme, Greenprint will set out exactly what the collateral should be, what information should be shared and with who. This includes internal lessons learnt, as well as useful knowledge shared publicly, trial updates and detail about the methodologies that will be used to deliver the programme. Dedicated comms resource will be assigned to support both the core programme and communications undertaken by ADEPT.

#### 2. Having the right governance, processes, and incentives to share effectively

SGC and WSCC will set clear standards for sharing, pathways for knowledge flow and ownership within the team. SGC and WSCC will ensure Knowledge sharing is built into core programme metrics that are reviewed on a monthly basis and are managed as part of core programme delivery.

#### 3. Using a Knowledge Base to aggregate and store knowledge

SGC and WSCC will develop a digital knowledge base to store and coordinate all elements of the information on the programme. This will be used both by internal team members, as well as being made accessible to other councils and interested parties. SGC and WSCC will use established document management methodologies to ensure people can search and scan through the Knowledge base quickly, e.g., using data tags.

#### 4. Implementing a robust programme of knowledge sharing activities

The activities for knowledge sharing will include but not be limited to:

Developing a programme specific communication strategy, Blogs and social media, Peer reviews, Conference attendance and speaking, After action reviews – shared with ADEPT, Centre of Excellence Website, Open project plan and key dates, Quarterly seminars / webinars, White papers: Circular economy, materials database, Cross industry collaboration, Bi-Annual show and tell sessions, Programme kick off and engagement event, Outcomes shared and integrated into university modules and Short sharp ‘lessons learnt’ profiles.





## 10.3. Your proposals for marketing and communications activities to mesh with those at the strategic programme level including the use of local expertise

In the final programme review undertaken by Proving Services it was highlighted that importance of active communications to the success of the programme was not initially appreciated by many of the Live Labs. Whilst the overall Live Labs project will have a core communications strategy Greenprint have recognised the importance of the project for not only the sector but the communities it serves. Figure 15 highlights how Greenprint will meet the communication objectives set out by ADEPT:

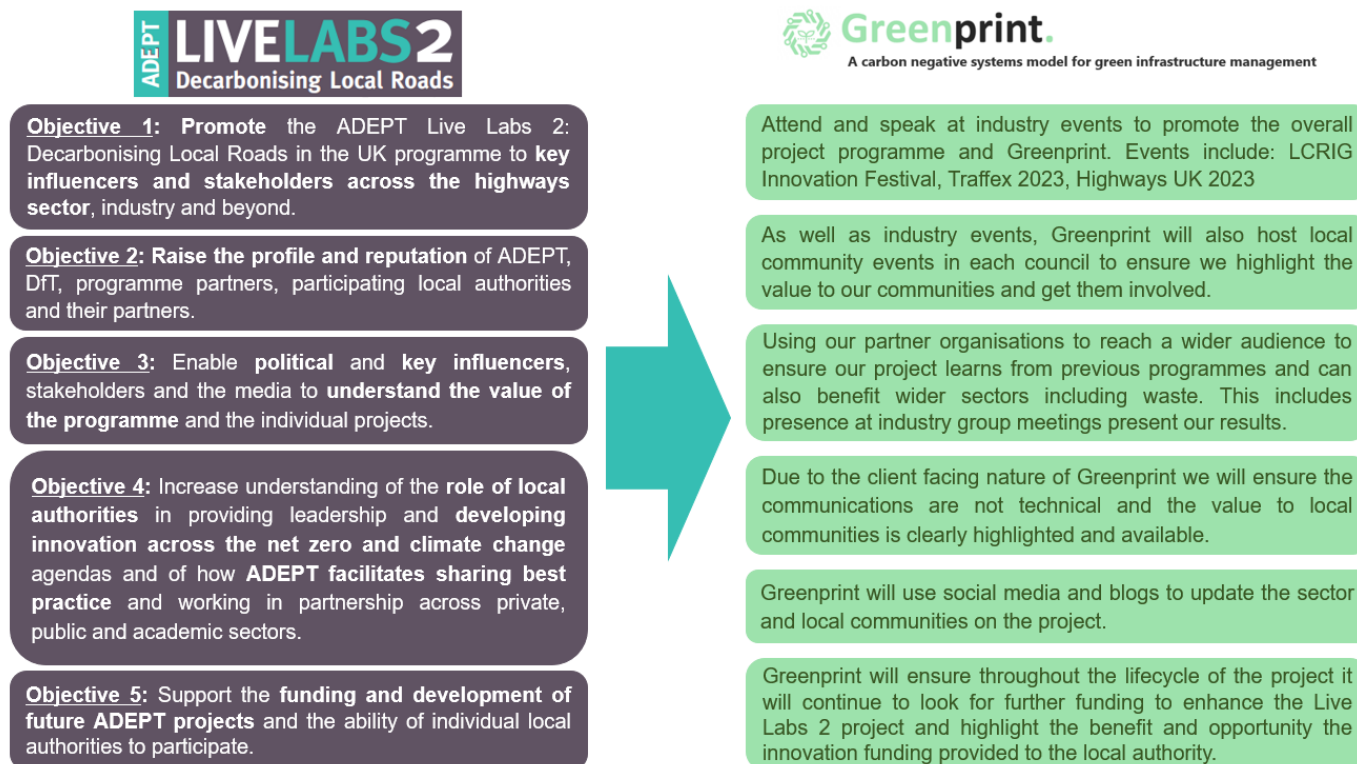


Figure 15: Mesh between the LL2 Communications Strategy and Greenprint

## 10.4. A statement that you will adhere to the collaborative, open and sharing spirit of LL2 and in addition what you will bring to enhance that working

*“Both SGC and WSCC are committed to the collaborative, open and sharing spirit of LL2. In the course of developing the Greenprint project we have formed excellent working relationships within and between our organisations. The project aims to strengthen links between departments, organisations and sectors to unlock the innovation and transformation needed to deliver a system led approach to drive down greenhouse gas emissions. Collaboration is right at the heart of the project and our vision. We have already greatly benefited from working together, and working with partner organisations such as Plantlife, Peakhill, and Amey who have all contributed at critical stages of project development, we are excited to be part of the LL2 journey!*

*We will proactively engage with LL2 programme activities and are committed to sharing Greenprint learnings and outcomes with other local authorities, enabling and inspiring them to build on and realise benefits from our learning. We have already started to share with other local authorities and sector networks who are interested in what we are trying to achieve and want to learn from our experience. We are also committed to collaboration with our local communities as we make changes to highway verge management. We anticipate that Greenprint communications will deliver wider benefits including better understanding of the role of local authorities, the vital functions of green infrastructure, and the benefits of circular economy approaches to deliver zero carbon emissions, nature recovery and resilience.”*



## Appendix A: GANTT Chart



GANTT Chart -  
Greenprint Final Subn



## Appendix B: Risk Register



Risk Register -  
Greenprint Final Subn



## Appendix C: Breakdown of Workstream Costs

Workstream Item	SGC Base Cost	WSCC Base Cost	Total Base Cost	Total Contingency Adjusted Cost
Outline Business Case	£20,000	£20,000	£40,000	£40,000
PMO and project management	£210,000	£210,000	£420,000	£441,000
Strategic carbon analytics	£200,000	£200,000	£400,000	£420,000
Verge management	£1,124,818	£870,000	£1,994,818	£2,097,065
Biomass processing	£10,000	£310,000	£320,000	£336,000
Biomass applications	£10,000	£95,000	£105,000	£110,250
Strategic 'Greenprint' Outputs	£112,500	£112,500	£225,000	£236,250
Communications	£135,000	£135,000	£270,000	£283,500
Corporate Functions	£30,000	£30,000	£60,000	£63,000
<b>TOTAL</b>	<b>£1,852,318</b>	<b>£1,982,500</b>	<b>£3,834,818</b>	<b>£4,027,065</b>

Table 20: Workstream costs by council