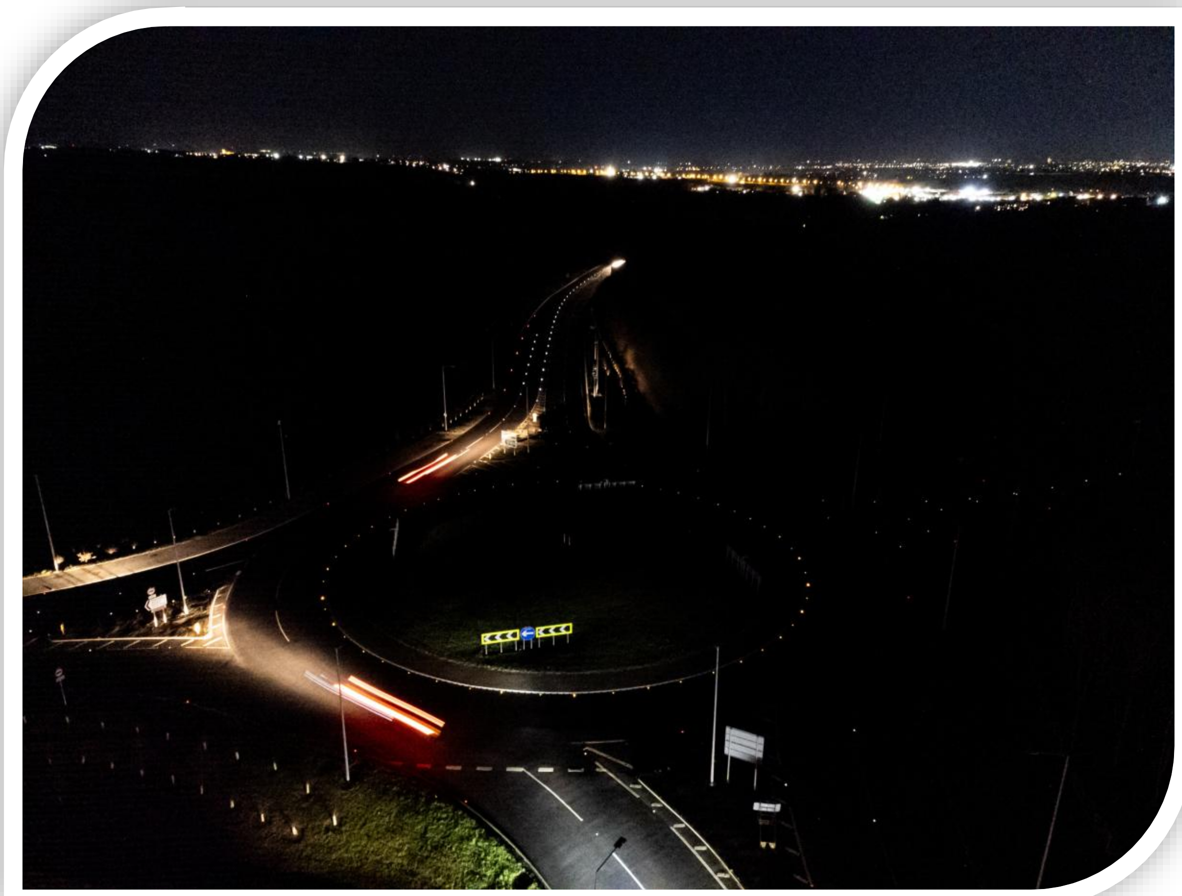
Decarbonising Street Lighting Live Labs 2

Final Report



KARL ROURKE
EAST RIDING OF YORKSHIRE COUNCIL
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Decarbonising Street Lighting Live Labs 2 Final Report

1. Executive Summary

The Decarbonising Street Lighting Live Labs 2 project represents a major national effort to rethink how the UK designs and manages its highway lighting infrastructure. Led by East Riding of Yorkshire Council with nine partner authorities, this £4.6 million programme set out to demonstrate that highways can remain safe, inclusive and cost-effective while significantly reducing dependence on carbon-intensive street lighting. Rather than focusing solely on improving the efficiency of existing systems, the project challenged the long-held assumption that conventional lighting is always required at conflict zones and on high-speed routes. It instead developed a sustainable, design-led approach centred on intuitive visual guidance through high-reflectivity materials, solar-powered road studs and carefully targeted pedestrian lighting.

A comprehensive, data-driven methodology underpinned the work across national test beds, including the development of an AI-enabled thermal imaging system to monitor driver behaviour and safety performance in real time. Alongside the safety monitoring, a robust carbon and cost modelling framework was established with Leeds University, resulting in a decision support tool that allows local authorities to compare traditional lighting renewals with alternative visual designs over different asset lifecycles. Legal and risk assurance were integrated throughout the programme with support from insurers and specialist solicitors, ensuring that all proposals were safe, defensible and compliant. Biodiversity monitoring formed a further strand of the project, assessing impacts on bats and birds through audio sensors and direct community engagement.

The outcomes of the programme demonstrate that significant carbon and financial savings can be achieved without compromising road safety. Over a ten-year period, the alternative visual designs deliver a 25 per cent reduction in carbon emissions compared to replacing traditional street lighting, rising to 36 per cent with value-engineered designs. Financial modelling shows savings of £1.24 million over ten years, even under conservative assumptions about future energy prices. In terms of road safety, most test sites recorded reduced vehicle speeds, including substantial reductions for vulnerable users such as motorcyclists. Night-time collision rates fell relative to the wider network, and behavioural observations showed clearer and more consistent pedestrian movements, particularly at the designated crossing point in Hayton.

The project has already begun influencing national sector practice. The Institute of Lighting Professionals is preparing new technical guidance, and the British Standards Committee is exploring future inclusion of the project's principles in upcoming standards updates. East Riding of Yorkshire Council and the Hull and East Yorkshire Combined Authority have invested an additional £4.5 million to scale the approach locally, with an estimated £6 million in long-term savings. As the project concludes, it provides a credible, evidence-based methodology capable of

transforming how local authorities approach lighting on the highway network. It demonstrates that carbon reduction, financial sustainability and public safety can be achieved simultaneously, offering a clear pathway for authorities across the UK to modernize their lighting policies and support national net-zero ambitions.

2. Introduction

The Decarbonising Street Lighting Live Labs 2 project, led by East Riding of Yorkshire Council with nine partner authorities across the UK, has been a £4.6 million, three-year project to transform how we think about lighting and the wider visual environment of our roads. For decades, highway design has relied on traditional street lighting standards, resulting in significant carbon costs from both energy use and the manufacture, installation and replacement of millions of lighting columns. With over 7.2 million streetlights across the UK costing more than £1 billion in energy each year and contributing over one million tons of carbon emissions, the sector urgently needed new thinking.

Participating Authorities

- East Riding of Yorkshire Council (Lead)
- Aberdeenshire Council
- Northern Ireland Highways
- Lancashire County Council
- Hull City Council
- Derbyshire County Council
- Cambridgeshire County Council
- Oxfordshire County Council
- North Lanarkshire County Council
- Westminster City Council

This Live Lab set out to show that highways can remain safe, inclusive and cost-effective while substantially reducing reliance on conventional street lighting. By testing innovations such as high-performance reflective road markings, advanced sign materials, solar powered illuminated road studs and low-carbon lighting for footways where essential, the project has demonstrated alternative approaches that support net zero, cut costs and enhance visual outcomes for all road users.

Evidence has been gathered through test sites in East Riding, most notably along the A1079 Hull–York corridor and the A164, and at partner locations nationwide. These have been monitored using cutting-edge technologies including the world's first application of AI and infrared cameras to monitor user behaviour 24/7. Supported by Sheffield University, The Institute of Transport Studies (Leeds University) and a host of technical specialists and supply chain partners, the project has investigated and undertaken a complex study and evaluation of the technical, safety, carbon and cost requirements to develop new standards for future street lighting. The project has also explored public perceptions, equality, biodiversity and the wider social role of lighting.

As the programme concludes, it has delivered a set of practical outputs:

- A Strategic Carbon and Cost Decision Tool to help authorities forecast carbon and cost savings.
- The evidence to inform the evolution of British Standards and highway design practice.
- Demonstrated test sites showing how carbon use can be reduced while maintaining or improving safety.
- Practical frameworks and guidance to support adoption by local authorities across the UK.
- A cutting-edge AI driven 24/7 driver behaviour and road safety monitoring system.
- Improvements in driver behaviour and road safety.

Together, these outcomes provide a foundation for permanent change. Making the case for a design-led, carbon-aware approach to the highway visual environment.

As the project has progressed, our work has been structured around a series of focused workstreams, each exploring a different dimension of the challenge. These reports represent the key outputs and outcomes from those workstreams - covering the technical, nature, legal, safety, community, carbon and cost cases. Together, these reports form the core outputs of the Live Labs 2 project and provide the evidence base needed to inform new guidance, influence policy, and support local authorities in making better-informed, lower-carbon and more cost-effective decisions about their street lighting and wider visual environments. Each report stands alone in addressing its specialist theme. Collectively they form the comprehensive picture of how to decarbonise the UKs street lighting and help to shape the future of sustainable highways.

3. Project Objectives

The primary objective of the project is to explore ways to decarbonise street lighting. However, street lighting can be an emotive issue, and any changes to existing lighting are often met with negative comments due to longstanding fears and other social factors associated with lighting public spaces.

For this project to be successful, a more targeted approach was required, one focused on street lighting located on the outskirts of, or entirely outside, urban areas. We have concentrated on high-speed corridors, bypass routes and primary A-roads, and instead of following the approach taken by many local authorities over the past decade, retaining street lighting but reducing energy consumption by upgrading the light source, we are asking a more fundamental question: is street lighting actually needed in these locations, especially given the development of alternative visual aids?

Our approach to decarbonising our street lighting stock and our key project objective was to challenge this safety mitigation assumption and to explore if there were low carbon ways of replacing street lighting with alternative visual equipment particularly at conflict areas on our test corridors, as our approach is full de-illumination where possible, even at conflict areas such as roundabouts, crossroads and priority junctions, areas that design guidance states MUST be lit. This, however, would need to be underpinned by data to provide rigorous evidence that this new approach would be safe.

From the outset, the team has carefully considered the future scalability of any proposed solutions. In essence, we approached this project from the perspective of understanding what reassurances local authorities need in order to embed innovation into their business-as-usual practices. When viewed through a local authority lens, the key objectives - beyond carbon reduction and road safety - also included demonstrating financial savings, providing a robust legal and risk framework, and exploring the impact that removing lighting may have on local biodiversity

When reviewing the test corridors and specific test sites, we encountered a fundamental challenge to our approach of replacing street lighting with visual alternatives; the presence of pedestrian footways and active-travel routes. This shifted our thinking away from a blanket de-illumination strategy and toward a more nuanced approach - providing the right light, in the right place, at the right time, while acknowledging the social factors associated with street lighting and the need to support safe use of night-time spaces. Some of these test sites still require lighting, but with a more carefully considered understanding of who actually needs it.

Local authorities are operating in ever-increasingly difficult financial situations, and the historical perception is that carbon saving costs money. To achieve national scalability and post project uptake, it was crucial that we were able to show financial savings to the highway authority.

At the beginning of the project, based on the fundamental premise of the project alongside the key priorities, we created a core project team and five working groups specifically focused on key themes relating to the decarbonisation of highways and how they apply to our project:

- Carbon and Biodiversity
- Street Lighting
- Risk and Legal
- Communication
- Academic Assessment

These working groups were chaired by people either within East Riding of Yorkshire Council or from our project partners, each with a specialism in the working group area. Similarly, the members of the working groups were drawn from partners and key external stakeholders with particular interest in these thematic areas.

The Carbon and Biodiversity Working Group was responsible for supporting, overseeing and scrutinising the carbon baselining process and its results, followed by the development of the Carbon and Finance Decision Support Tool. The Street lighting Working Group was established to review current street lighting standards and to assist in the design and implementation of pedestrian-focused lighting. The Risk and Legal Working Group provided scrutiny and oversight of the risk assessment and risk management processes, as well as engaging with insurers and solicitors during the development of reports. The Communications Working Group handled all formal internal and external communications as the project progressed and was tasked with developing a range of communication plans and protocols. Finally, the Academic Assessment Working Group undertook literature reviews related to the project objectives and explored potential impacts on crime.

The main focus of the core project team was to link all these workstreams together and to explore the central focus of the project, the replacement materials for street lighting. The core project team, led by the project manager, kept the project on track ensuring the core objectives of the project remained the primary focus of project activities. The three key objectives were to:

- Reduce Carbon
- Reduce Cost
- Maintain or Improve Road Safety

4. Project Scope

This project began in 2023 with a relatively broad and undefined scope, which became clearer and more focused as the project progressed. This project did not however, deviate at any time from original premise set out in its Strategic Overview Business Case *"Driven by a vision towards zero carbon, cutting edge approaches including next generation signs, lines, and solar road studs, we will create enhanced visual outcomes for all road users".*

The East Riding of Yorkshire test beds cover two primary A routes across the county as seen in appendix 11.1. However, the scope of this project is not limited to just East Riding of Yorkshire alone.

From the outset of this project, it was vital to secure as many test sites as possible across our partner organisations nationwide. This ensured that the results from the East Riding test beds were not simply a consequence of our geographical location, or of having relatively low levels of transient population and road users. Partner test sites enabled meaningful comparison and helped demonstrate that any observed changes were not local anomalies but reflected fundamental driver behaviour. They also allowed us to show that carbon and cost benefits could be achieved regardless of geographic context.

After a significant amount of site analysis between the core team and local authority partners we were able to identify suitable test sites in Aberdeenshire, Northern Ireland, Lancashire, Derbyshire and Oxfordshire. The test sites were selected to replicate similar test sites in East Riding to ensure comparability in terms of results.

Initial investigations prior to the project officially commencing had identified potential high visibility alternatives for street lighting, namely high reflectivity markings, sign materials and illuminated road studs, however the initial scope of the project team was to investigate the properties of these materials and apply them in the form of a new design ethos, placing lighting as a last resort.

A fundamental area for the project was understanding and ensuring road safety. The core project team were responsible for ensuring a robust methodology for risk assessment and risk management and development of suitable technologies to ensure this.

The final area in scope for the core project team and associated working group was the overarching focus of the project, the issue of quantifying carbon. This was required to be split into two areas, baselining existing equipment and forecasting of proposed replacements.

These two elements of carbon reporting brought with them specific challenges such as how to baseline end of life assets. Was the required information available from the sector? Over what lifespan do we baseline carbon? What known factors will affect future carbon?

Many of the working group members were undertaking their roles within the project alongside their substantive posts. For the Carbon Group this meant external assistance would be required to both baseline carbon emissions and the subsequent carbon forecasting.

The Carbon and Biodiversity Working Group identified the need for a tool to enable the forecasting of carbon following a review of tools already in existence against the needs of the project. External support was sought to develop a tool to enable carbon forecasting. Leeds university worked with the Group to develop a tool which could quantify both carbon and financial impacts of actions taken on the highway over a whole life. The aim of the tool was to facilitate sustainable decision making based on an holistic view of the impacts of changes to highway lighting.

5. Methodology

5.1 General Methodology

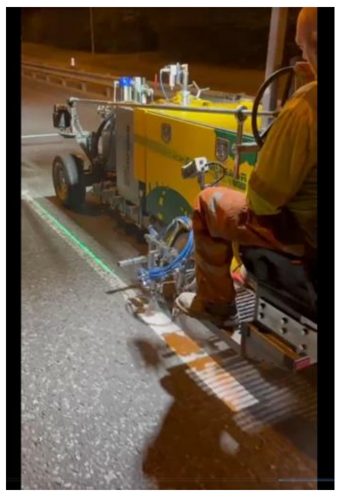
As many local authorities have found over the years, changes to street lighting often face resistance from residents. From the outset, it was clear that delivering positive results and communicating a strong, evidence-based message required a data-driven approach.

We have taken a structured approach to the project with a laser-like focus on our three key project aims. With those aims in mind specific areas of work were identified in the early stages of project delivery:

- Product / Project Support Procurement
- Test Site Risk Assessment
- Visual baselining
- AI Development
- Test Site Design

- Carbon Baselining
- Test Site Installation
- Carbon and Finance Decision Support Tool Creation
- Biodiversity Monitoring
- Legal and Highway Risk Management Assessment
- AI Data Processing

Firstly, the core project team created procurement contracts for project support and materials that covered the duration of the project. Primary consideration for materials procurement was to identify highly visible highway materials including illuminated road studs, increased reflectivity signage materials and increased retro-reflectivity lining products. These materials have formed the basis of our risk assessment process and designs.



[Installation of illuminated road stud / Installation of road markings / Category 3 sign]

Once identified, the materials such as the Clearview Solarlite solar powered illuminated road stud, minimum 250mcd road markings and Category 3 sign materials form the basis of the shift away from standard illumination to target intuitive visual design and were then incorporated in the ensuing risk assessments.

The use of Category 3 sign materials was confirmed after investigation at an early stage of the project due to the specific properties of the material compared to the standard Category 2 materials currently used on the national low speed network. Whilst the two materials perform similarly and have identical levels of retro-reflectivity at distance, typically 120m to 70m distance, in effect reflecting the same amount of light from vehicle headlight to the driver's eye, across all vehicle types, the difference was in the shorter distance ranges <30m. At this distance range the levels of retro reflectivity of Category 2 material reduce to zero, so in practical terms the vehicle driver is unable to see the sign through the use of just vehicle headlights, particularly heavy goods vehicle drivers where the angle between vehicle headlights and driver's eye is substantially greater than a passenger car driver. Category 3 materials retained appropriate levels of retro-reflectivity at distances as close as 5m.

Understanding the difference between the two properties led to the decision that across all trial sites Category 3 sign materials would be used on all verge mounted signs whilst retaining Category 2 sign materials on all signs directly in line with vehicle headlights, such as chevron markers on roundabouts. The use of category 3 materials in these locations could result in drivers being dazzled by their own headlights given the increased retro-reflective properties of the material.

5.2 Risk Assessment and Design Methodology

Working with our road safety specialists, Local Transport Project, all test sites identified underwent a full road safety risk assessment and collision review with the underlying principle of street lighting being a last resort. This process returned a positive appraisal of the use of alternatives to street lighting with the exception of three roundabout sites. These sites were discounted as trial sites mainly due to geometry and the impact that the specific nonstandard geometries had on existing collision records. It was evaluated through the risk assessment process that installation of alternatives would require significant investment and that retaining existing street lighting was the appropriate course of action. Aside from these three locations, all other proposed test sites were deemed appropriate for design and trial. In order to show a robust risk assessment process, the recognised document GG104 was followed for all proposed sites.

Interestingly, the risk assessment process and ten-year collision history helped to identify at an early stage night-time collision rates and the most common form of collision across our three conflict typologies, roundabouts, junctions and crossroads (examples of which can be found in appendix 11.2). In summary, the risk assessment process identified that 80% of collisions across all conflict zones occur in daylight hours and the most common forms of collisions were directly attributable to driver error rather than the presence of light or not. Following completion of the risk assessment process, site designs were developed for each test area, making use of the materials identified.

In partnership between the core project team, Risk and Legal Working Group and Local Transport Project, it was decided that the designs would follow the existing Traffic Signs Regulations and General Guidance Document 2016. This allowed for the testing of basic road layout principles and to avoid the need for requiring additional risk assessments and obtaining multiple 'departures from standards' from the Department for Transport.

The final stage of the risk assessment and design process was to undertake stage 1 and 2 site safety audits prior to construction to identify any site-specific hazards that may be present and require mitigation prior to work commencing. Recommendations from these audits were minor and were mainly focused on vegetation growth and sign visibility. An example of test site design can be seen in appendix 11.3.

5.3 AI Development

Data collection and providing robust evidence was always fundamental for giving a positive and proactive message to our residents, but also for future scalability and early uptake across wider local authorities. Road safety data, being one of the three key data streams, and as the risk assessment and designs were progressing through the course of year one of the project, our attention was able to turn to how to collect this information.

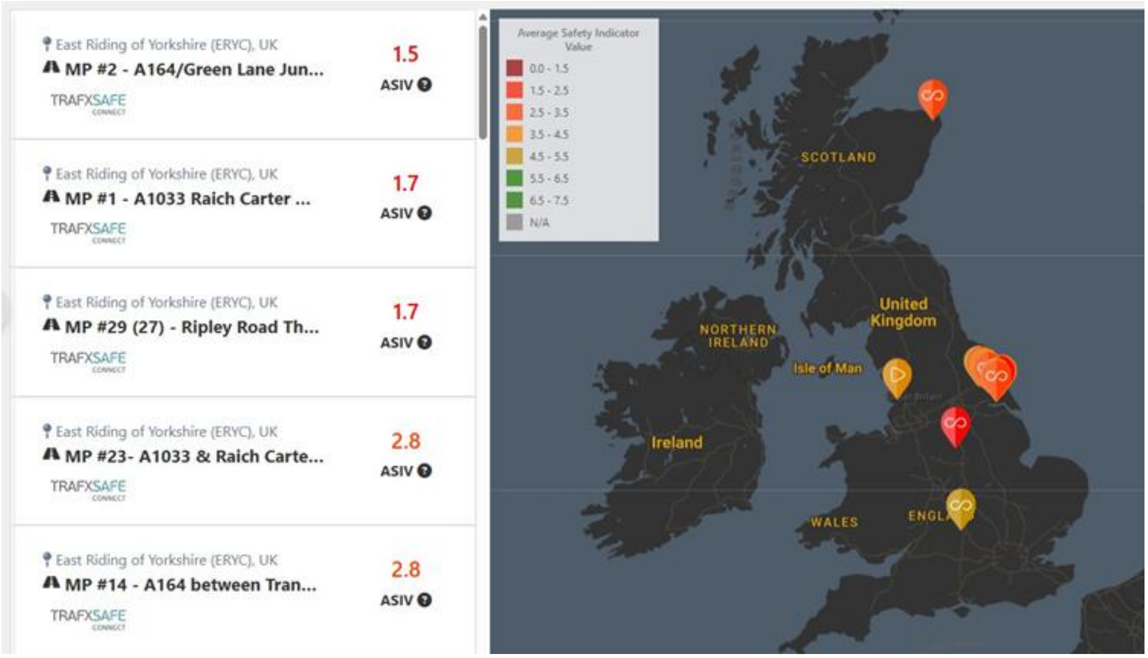
There are many systems on the market capable of collecting traffic-related data, typically using visual-based AI to provide information such as vehicle classification, driver speeds, harsh braking, lane positioning, and near-miss events. However, during our market investigation, a fundamental limitation became apparent. We required a system that could collect data both under standard street-lit conditions - allowing us to establish a robust baseline - and in full darkness after switching from traditional lighting to the new design layouts. Unfortunately, we were unable to identify any visual-based system capable of operating fully across both lighting environments.

After discussions with several suppliers about developing the system we required, Transoft Solutions recognised both the potential and the unique challenge involved. Rather than charging us for bespoke development, they agreed to co-develop the system with us.

The solution to the unique data-collection challenge we faced was to deploy thermal imaging cameras and adapt Transoft's standard platform to process thermal imagery. The project procured thirty thermal imaging units, and - working closely with the scheme designers to determine optimal camera angles, mounting positions, and viewing distances for the AI system - these cameras were fully integrated into the final design layouts.

To ensure consistency in the data collected, one junction and one roundabout along the test routes were selected to remain illuminated. Cameras were positioned on each entry arm of the roundabout and aligned to cover the give-way line at the junction, enabling the collection of driver behaviour data for all movements, as well as near-miss events within the conflict zones. This approach was replicated at all conflict sites scheduled for de-illumination, along with two linear sections.

Monitoring these control sites provided a reliable comparison for the de-illuminated locations once lighting was switched off. In addition, after all cameras were installed, we captured a full week of data across every site in September 2024. This dataset - recorded under normal daytime and street-lit conditions - forms our primary baseline for comparison as the project progresses. The intention is to analyse before-and-after performance at key intervals following de-illumination.



[TrafXsafe dashboard]

The system operates on a dashboard style platform and provides us with driver speed, vehicle counts, near miss, and pedestrian flow data in real time. It was important to have real time capability for rapid response post de-illumination should our hypothesis of intuitive designs be incorrect and safety risks increased or localised issues came to the fore that required specific engineering responses.

The system identifies potential collisions and along with logging this as a data record, it also logs the video clip of the near miss for later review. Again, this can help the project team identify any potential common forms of near miss and explore possible engineering solutions.

[AI Conflict Video snapshot]

The data provided by the system has been collected continuously since the test sites went live on 4 April 2025 and evaluation and comparison to the September 2024 baseline week has been undertaken for the month of April 2025, September 2025 and November 2025.

5.4 Carbon Baseline and Forecasting

The central premise of the Live Labs 2 programme is to quantify and reduce the carbon impact of our highways. There is a deep-seated perception, particularly in local authorities that carbon reduction costs money, so it was important for our project to not only provide a carbon baseline for business-as-usual operations such as replacing end of life lighting, but to provide both cost and carbon comparisons for our proposed alternatives in order to evidence value for money. An approach such as this can help local authorities intending to apply this methodology to prepare business cases and funding bids.

Initially we needed to understand and calculate the existing carbon baseline for the street lighting as it existed at the time. The project has used the assumption that replacement would be made at the point of decision, either end of life or initial design. This raised an inevitable question, how to provide a carbon baseline for forty-year-old assets when no information exists from the time of manufacture?

Based on directions from our Carbon and Biodiversity Working Group the decision was taken to generate a baseline using the current carbon cost for like-for-like replacement of the end-of-life street lighting. This way we would have current data to work with, and it would replicate the day-to-day decision process being taken by local authorities.

Because of the nature of street lighting, it being a long lifespan highways asset with little or no change over its forty-year life (except for energy consumption and occasional planned and reactive maintenance) baselining such an asset should be a relatively easy process.

Average fault attendance data, vehicle data and planned maintenance data was obtained from East Riding of Yorkshire Council and key assumptions agreed between the core project team and Carbon Working Group, that profiling would be based on all activities beyond the depot gate. The challenge in this process came when attempting to baseline the individual scheme components. The street lighting sector has considerable ground to make up on its highway counterparts such as tarmac in terms of its carbon understanding and we were left with numerous gaps in the dataset that had to be filled with government published proxy data based on materials and weight. The carbon baseline was created and submitted in May 2025, and the detailed report can be found on the ADEPT Live Labs 2 website.

Once the designs were completed and submitted, we moved into phase two of this workstream. With the approved layouts being installed, the project now held complete before-and-after quantities and associated costs. However, in collaboration with the Carbon and Biodiversity Working Group, a further decision was taken to approach the University of Leeds. The university had recently developed a carbon-forecasting tool for road surfacing - closely aligned with the type of model we required for street lighting - making them a suitable partner for this next stage of the project.

The scope that Leeds University received was to create a multifunctional tool, populated with data taken from the baselining process along with additional data for the replacement materials and processes. This tool would be required to incorporate cost, taken from the real-life costs of applying the East Riding test beds, but to also have functionality for specific material input by the user, and both expert and strategic function targeting both detailed site-specific design and whole asset assessment based on default parameters.

With oversight from the project manager, chair of the Carbon and Biodiversity Working Group and data analysts from Local Transport Projects, along with input from local authority project partners to ensure the tool was inclusive and met the range of needs identified within the group, this tool was finalized in September 2025.

Unlike the baseline the tool factors in the electricity grid decarbonisation for all assets as detailed by Central Government and provides comparison over a forty year period, the average lifespan of a lighting column and includes all manufacturers' recommended refresh rates for all replacement products and has been applied to all East Riding of Yorkshire Council test beds along with national partner test sites.

Design Solution Table 1 — Solution 1: Add Assets

Assets	Asset Unit	Quantity	Is the installation when (or after) the existing asset(s) expires?	Is the installation in line with road work?
E-Street Lighting	No.	810	Yes	Yes
E-Reflective stud	No.		Yes	Yes
E-Road Marking	m	64800	Yes	Yes
E-Lit Sign	No.	70	Yes	Yes
E-Sign Face	m2	28	Yes	Yes
Total		**65708**		

Clear users' inputs for Design Solution 2

Name of Design Solution 2:	
Description:	

Design Solution Table 2 — Solution 2: Add Assets

Assets	Asset Unit	Quantity	Is the installation when (or after) the existing asset(s) expires?	Is the installation in line with road work?
P-Road Marking	m	64800	Yes	Yes
P-Sign Face	m2	28	Yes	Yes
P-Solar Stud	No.	3240	Yes	Yes
Total		**68068**		

[Snapshot of carbon & Finance Decision Support Tool]

5.5 Test Bed Installation

Test Bed installation in East Riding of Yorkshire took place in Summer and Autumn of 2024 and were the primary focus of the second year of the project. In total 17 test sites were delivered with four partner test sites being constructed in early 2026 following a year's data assessment from the primary East Riding test sites.

As per the approved designs over 80km of new road markings were laid, over 5000 solar powered illuminated road studs and over 143m^2 of Category 3 signs were installed. Solar powered vehicle activated signs were also installed at high-speed approaches to roundabouts, calibrated to 40mph and placed at 90m distance as an additional safety intervention.

[Riplingham Road and Swanland Dale Roundabouts, A164 before and after]

Over the winter period of 2024 pedestrian-only lighting was installed at four sites that were identified through the risk assessment process as having significant pedestrian usage. This method of lighting, using low carbon products such as lighting columns made from 80% recycled aluminum, was designed specifically for pedestrians and designed to only light the footway and give no light spill on the carriageway to retain the non-illuminated carriageway approach.

This lighting was developed in conjunction with the Street lighting Working Group and is above and beyond existing British Standards, which are somewhat lacking in terms of pedestrian only provision, where lighting for pedestrians is treated as a byproduct of lighting the carriageway.

Several different designs were submitted for this lighting approach; however, the common features across all proposals included a reduced mounting height of 3m instead of the standard 5m, along with improved lighting levels and uniformity. These enhancements were intended to provide users with consistent illumination, clearer visibility of the footway surface, and the ability to make effective threat assessments at a greater distance.

One design option used one-metre-high illuminated bollards, which required a significant number of units to achieve the desired lighting levels and uniformity. However, once installed, this approach raised several practical issues, particularly when positioned adjacent to a live carriageway.

5.6 Highway Risk Management

Local authorities tend to be risk-averse, particularly when it comes to innovation, and many adopt a "we'll go second" approach. For this project to be scalable beyond its completion, we were conscious from the outset of the need to view our work through the eyes of a decision-maker with no prior knowledge of the detailed work undertaken over the three-year period. In essence, we needed to ensure we could address every potential reason a decision-maker might have for saying no - especially around risk exposure and maintaining a defensible legal position, which are often at the forefront of such considerations.

At the end of the first year of the programme - when risk assessments and designs were nearing completion - the project, through the Risk and Legal Working Group, engaged with East Riding of Yorkshire Council's insurers and specialist highway solicitors. The intention was to bring them fully into the project, ensuring they had oversight of the proposals, the associated mitigations, and the emerging data collection methodology.

Throughout the final two years of the project, both organisations remained closely involved. They were given full visibility of all collected data, the completed risk assessments, and a detailed understanding of the AI-based driver monitoring system. Their input provided essential legal challenge and clarification, particularly in defining what legally constitutes a "system of street lighting" and how this affects matters such as speed-limit enforcement.

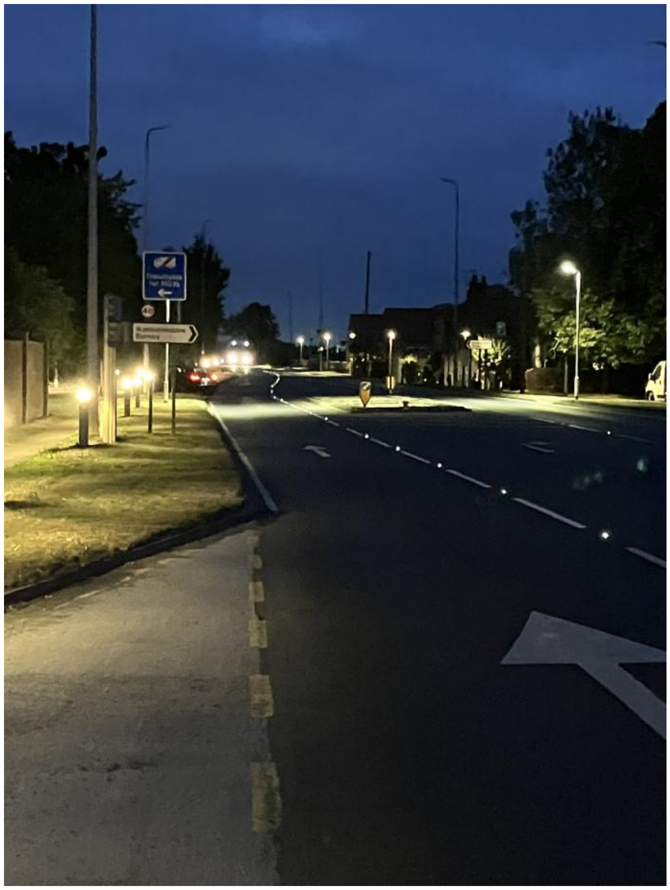
The project team commissioned both organisations to produce written assessments detailing their views on our approach to highway risk management, the legal position, and relevant case law concerning the provision and removal of street lighting. These reports are available on the ADEPT Live Labs 2 website.

5.7 Biodiversity Monitoring

The final significant workstream focused on monitoring whether changes to street lighting had any measurable impact on local biodiversity. We entered this workstream slightly later in the project timeline than originally planned, and because securing a sufficiently long period of primary data collection was essential, we had to adapt our approach to biodiversity monitoring accordingly.

This element of the project specifically examines potential impacts on birds and bats. Previous studies have demonstrated links between artificial lighting and altered bat behaviour, while a recent UN study estimated that more than 100 million bird deaths each year may be attributable to artificial lighting. These findings highlighted the importance of incorporating biodiversity considerations into the project's evaluation framework.

Our initial intention was to install a series of camera traps throughout the village of Hayton in the East Riding of Yorkshire. This location is the only test site within the two main routes that passes through a populated area. Hayton is a small village of 126 properties, bisected by the A1079, and historically lit by 12m street lighting columns along its entire length. Under the project, this location received pedestrian-scale lighting along both footways, an illuminated uncontrolled crossing point at the village centre, and full carriageway interventions including illuminated road studs and enhanced road markings.



[A1079 Hayton with Pedestrian Lighting]

We were unable to begin the desired biodiversity-monitoring methodology before switching from conventional lighting to the Live Labs 2 approach, which required us to rethink our planned method.

Following consultation with our biodiversity lead and through the Carbon & Biodiversity Working Group, we identified a suitable control site - a village of similar size near Hayton. We then installed a suite of audio sensors in both the control village of Melbourne and in Hayton to enable comparative analysis of activity, rather than assessing direct change within a single location. The sensors capture both audible-frequency recordings for monitoring bird activity and ultrasonic recordings for bat activity. These devices have been collecting data continuously since May 2025.

Alongside this, an enhanced programme of community engagement was delivered in Hayton, working closely with the Parish Council and local residents. Activities included nature walks, bat counts, and mammal surveys across the village, supported by the installation of several camera traps in residents' gardens to map general biodiversity activity. This combined approach provided additional ecological insight and strengthened community participation in the project.

6. Budget and Funding

As detailed in our original Strategic Overview Business Case, the original valuation for this Live Labs 2 project to deliver everything we planned to deliver was £5m, however our final allocation was £3.24m, limiting our ambitions for this project.

With effective procurement, strict budget monitoring and supporting match-funding from both East Riding and our partner authorities totaling nearly £2m, however, we have been able to deliver an efficient, effective and successful project that has delivered tangible benefits and savings to both ourselves, our partners and early adopters who chose to apply this methodology.

A further £4.5m investment resourced from both East Riding of Yorkshire Council and the Hull and East Yorkshire Combined Authority shows the confidence in the benefits this approach can bring and enables the project ethos to continue past project completion and enables East Riding of Yorkshire Council to be the first large scale adopter in the country, with an estimated 2,500 lighting columns being replaced showing an estimated £6m savings across both revenue and capital funding streams.

7. Project Risk Management

Alongside risk management for our travelling public, the project had to closely monitor risk, its approach to risk and risk management throughout the three-year programme. This Live Labs 2 project has constantly operated in an area whereby if the original hypothesis was wrong, that street lighting could be safely replaced at conflict zones, then it had the potential to cause serious harm or worse. Alongside this we were dealing with a highways asset that is extremely emotive and can provoke extreme responses.

The project team, including the various working group chairpersons, adopted a two-pronged approach to project risk management. The first being a constantly live risk register, reviewed at any point should an incident occur that directly impacted the project as a whole and reviewed on a regular basis by all project partners, local authority, private sector and academic support at our regular all-partner meetings. The second being the creation of a detailed communications plan, updated annually and with a number of communications documents underneath this such as regular partner and public newsletters, annual chief executive updates, member engagement and a document detailing communications required counting down to test site activation.

[Partner Meeting Risk Register Review]

This was also supported throughout the project with regular budget monitoring meetings, the creation at the outset of the project of a Project Board made up of members from East Riding of Yorkshire Council and externally providing quarterly updates into the Project Board, along with quarterly working group meetings and working group chairpersons meetings to share knowledge and learning from across the different workstreams.

8. Outcomes and Benefits

Over the past three years, this project has represented a substantial collective undertaking, and the outcomes achieved have been highly impressive. This is particularly noteworthy given that, for every member of both the core and wider project teams, the work has been delivered alongside their regular operational responsibilities rather than forming part of their core day-to-day roles.

In presenting the outcomes of this project, it is appropriate to return to the three key objectives set out at the start of this report (which may now feel some time ago):

- Reduce carbon
- Reduce cost
- Maintain or improve road safety

8.1 Carbon Results

From the outset of the project the anticipated outcome of our replacement designs was an overall carbon reduction across the test corridors by replacing street lighting with our alternative designs. Our Carbon and Finance Decision Support Tool was constructed with the potential for business-as-usual replacement of street lighting as the main asset to compare against in terms of lifespans, giving us a forty-year appraisal period which is the typical life of a street lighting column. With the replacement assets having a manufacturer's suggested lifespan of ten years, this forced us to factor in asset refresh at years 11, 21 and 31. The original tool design also factored in energy grid decarbonization rates over the next forty years as published by Central Government, but this grid decarbonization was only applied to the energy consumption of the possible street lighting replacement.

When the tool was first applied to the test site, the initial outputs suggested a significant increase in carbon emissions. However, further investigation revealed this was due to calculation errors rather than an actual rise in carbon. What also became clear was that the comparison being made was not like-for-like. The initial assessment compared the proposed new street lighting equipment against the existing stock without accounting for the effects of energy decarbonisation on both scenarios. In addition, the same decarbonisation assumptions had not been applied to the replacement materials. Once these issues were corrected, the results provided a more accurate and meaningful comparison between the existing lighting system and the proposed design.

This has been rectified manually and now shows positive returns of 8% reduction over a whole life period with value engineering applied which will be discussed in greater detail in section 9. There is also the issue of the certainty of the projections over the forty-year period. Whilst we can quantify the carbon reduction now with near certainty over the next ten years up until the first replacement asset refresh point, the certainty that the carbon factor of these products will only decrease in line with energy decarbonisation cannot be guaranteed, particularly as market forces are applied and studies show that as a product marketplace matures then overall carbon and cost reduces by up to 25%. This level of uncertainty over the carbon factors for the replacement products is then compounded at refresh points of 21 years and 31 years until we get to the point where we are projecting carbon figures in the final ten years of life with high levels of uncertainty.

On reflection and based on the ethos of the project being based on key decision points in asset lifecycle, the focus of the tool should be based on the ten year carbon figures and a fresh decision should be made at the point of replacing the alternative materials, rather than the single decision point at street lighting end-of-life then applying for the next forty years.

Detailed carbon results can be found in appendix 11.4 and to summarise based on the ten-year high certainty appraisal period the test beds as applied across the project have saved **118t** CO2e equating to a **25%** reduction compared to street lighting replacement. With additional value engineering this figure has the potential to rise to **168t** CO2e equating to a **36%** reduction compared to street lighting replacement. Our results also highlight the variability of carbon savings across test sites due to design and usage differences at test site level. Across all sites carbon savings range from increasing the carbon by 27% to decreasing carbon by over 53%.

8.2 Financial Results

Similar to the carbon results, there is extremely high uncertainty over potential financial savings when appraised over a forty-year period, due to market and global forces applying to all material costs and particularly to energy costs. As we have seen over recent years, energy costs are inherently linked to global political stability and fluctuations in global certainty can have significant impact on energy prices both positive and negative. There is no denying however that this project shows significant financial saving both short and long term, and while we cannot guarantee energy costs over both the next ten or forty years, the general trend is upwards, and as energy costs increase, so do the possible financial savings available through our methodology.

Based on the premise that energy prices miraculously remain static over the next forty years our decision support tool shows a saving across all Live Labs test sites of £1.31m. Over the next ten years, where energy prices are more likely to remain closer to current rates the test sites show a savings return of £1.24m.

Savings of this nature cannot be ignored by any local authority. Put in percentage terms and on the basis that energy prices remain static, this equates to a saving of 31% over a forty-year period and a saving of 58% over a ten-year period. Across all sites financial savings range from increasing the cost by 6% to decreasing cost by over 91%.

8.3 Road Safety Results

Two out of the three key outcomes show a positive result and help to build a strong business case for action but without considering safety, no local authority would adopt the proposed methodology for street lighting. Road safety is the single key measure by which our residents and travelling public will judge the project.

It is important to note that this data collection has only been collected for a year and whilst it gives important insight into the road user response to the new visual layouts, further ongoing monitoring is required. We have secured the AI data collection and evaluation for a further two years post project which will give a full three-year period of data collected across the range of test sites. This is crucial to determine if the changes we see in the range of data in appendix 11.5 remain constant or if they are a short-term effect.

The data so far has shown some positive impacts along with highlighting some surprising detail. We have evidenced that three quarters of the test sites have seen speed reductions, up to 10% in some locations. The locations where we have seen speed increases are predominantly linear sections with full interventions applied. Further, even with speed increases on some sites, the average speed is still within the prescribed speed limits. More investigation will be undertaken as to the reasons behind these speed increases with possible engineering changes to follow.

Speed has a direct impact on the severity of any collision that may occur therefore by this measure of safety we have met the initial aims of the project. This is evidenced when considering the average driver speeds by vehicle classification. On one test bed (a 40mph dual carriageway with active travel route with pedestrian lighting installed), we have seen average speed reductions across all vehicle types, with the largest impact of over 10% on motorcyclists. This category of road users is the most vulnerable if involved in a road traffic collision and any reduction in overall speeds can increase the chances of collision survivability considerably.

It is also important to note that the speed reductions evidenced through data collection are set against a backdrop of relatively static levels of road usage. The majority of sites have shown small increases in driver usage compared to the baseline taken in September 2024, which was an average week, outside of school holiday periods with average daily commuter and leisure travellers.

When the average speed data is analysed closely over a full 24-hour period, we are also seeing reductions across over half the test sites in average daytime speeds. Whilst this may not be a direct result of reducing average night-time speeds, it is a data stream that we will be closely monitoring throughout the post-project monitoring period to ascertain whether there is a direct correlation between night-time and daytime speeds and if overall behaviour changes have taken place.

Speed reductions represent only one component of the overall road safety picture. While lower speeds can help reduce the severity of any collision that may occur, the primary objective of this project was to minimise the likelihood of collisions in the first place.

It is important to introduce an element of realism when considering the outcomes. The project involved replacing lighting at recognised conflict zones along heavily trafficked primary routes, each carrying in excess of 18,000 vehicles per day. These locations are termed conflict zones because they are areas where vehicle movements naturally intersect, creating an inherent potential for conflicts.

Given that these interactions depend on human decision making, it is not possible to eliminate collisions entirely. However, the improvements implemented - particularly the upgraded lighting - are intended to reduce both the probability of collisions occurring and the severity of those that do.

We have already ascertained that the predominant cause of collisions at these sites is driver error, and until humans are removed from the decision making process entirely, there will continue to be collisions at these sites, however if the changes we have made through the new designs can raise driver awareness and reduce overall collision rates then we have delivered a successful design.

As we can see in the collision data evidenced in appendix 11.5 night-time collision rates across the test sites are down compared to the previous year, bucking the overall trend across East Riding of Yorkshire for the year 2025/26 where overall collision rates have increased. Detailed reviews of the collisions that have taken place have also shown that all related to road user error and the presence or lack of lighting had no bearing on the collisions.

[Hayton A1079 thermal camera image]

8.4 Biodiversity Monitoring

At the point of generating this report this element of the project is still ongoing. The audio data collection for both birds and bats will complete at the end of March 2026 and then be analyzed and evaluated for change.

[Image of otter in residents garden caught on Live Labs 2 camera trap]

The camera trap data provided some interesting results in terms of understanding the local biodiversity around the village of Hayton and provided an excellent opportunity to engage directly with the residents and obtain feedback regarding all aspects of the project. It has provided some excellent insights and has identified the presence of otters that were previously unreported in the local waterway.

Further biodiversity monitoring is also underway in Lancashire where we have the opportunity to catch data both before and after the transition from standard lighting to Live Labs methodology. Results from this study will also be collected and reported on in coming months.

The work undertaken under the umbrella of biodiversity monitoring in the village of Hayton provided a crucial link between the project team and residents. It allowed for wider engagement surrounding the project and allowed for co-creation between the central project team and local residents particularly in the area of pedestrian lighting.

This link proved vital in understanding the impact of the replacement lighting, not just from a technical perspective but from a lived experience. It highlighted issues around position of the new lighting and significantly the issue of having the light sourced mounted 1m above ground in the form of the illuminated bollards. Residents raised issues around glare from a motorist's perspective and the perception of vehicles approaching due to the fact that the light source was in line with a vehicle driver's eyeline. These issues were not present with the lighting mounted at 3m and subsequently the 1m mounting height lighting has been replaced with a 3m alternative.

8.5 Pedestrian Lighting

[Pedestrian Crossing Point A1079 Hayton]

Results from the installation of pedestrian lighting so far are encouraging. On the test sites with pedestrian lighting installed we have seen user numbers increase through the hours of darkness. It has also brought around an interesting element of behaviour change in the village of Hayton as seen in the image.

This form of lighting has also shown maintenance savings due to the reduced mounting height and the removal of the need for traffic management and large plant and lifting vehicles to maintain. There is also the issue of vegetation growth causing shadow on the footway. The lighting heights of 3m or below removes this issue completely, particularly on council-maintained verges as 3m is the hedgerow cutting height and vegetation can be allowed to grow upwards of this height without impacting the light on the footway.

Prior to the installation of the full test site in Hayton on the A1079, under the conventional method of lighting the entire highway, pedestrian and cycle users were crossing this primary road at any location that they wished. Since the removal of lighting on the carriageway and the installation of pedestrian lighting linked by lighting the uncontrolled crossing point activated by PIR presence, we now see 100% of crossing movements take place at this illuminated point. This change demonstrates a significant improvement in user behaviour, with all pedestrians and cyclists choosing to cross at the safest, purpose-lit point rather than dispersing across the wider carriageway.

[Pedestrian Lighting A1079 Raich Carter Way]

It would be reasonable to expect this behavioural change to occur only during the hours of darkness; however, the pattern has also carried over into daytime movements. In September 2025, a total of 578 footway users were recorded crossing at the designated crossing point, with no crossings observed elsewhere along the road.

Additionally, there have been no recorded instances of road-user confusion or harsh braking at the crossing point during darkness. This indicates that drivers instinctively recognise that they retain priority at this location and do not attempt to stop unnecessarily for pedestrians. The data therefore suggests that the crossing operates as intended, with clear understanding of priority and with no adverse impact on driver's behaviour.

During the course of the project, the core team and Street lighting Working Group have been in regular contact with the Institute of Lighting Professionals (ILP), the sector body for lighting designers and managers and have updated them on the progress of the overall project and in particular the progress of the pedestrian lighting. The support shown for the project from the ILP, particularly in relation to the pedestrian lighting has prompted the call for the creation of an ILP Technical Guidance Document to be created over 2026 evidencing and describing the safe removal of conflict zone lighting along with a call from the British Standards Committee into the project and the Street Lighting Working Group to form a specific British Standards Working Group to expand on the pedestrian lighting work undertaken by the project, provide more technical lighting specific detail with a view to updating this element of British Standards at the next available opportunity.

9. Challenges and Lessons Learned

Although this project has delivered positive outcomes, influenced sector-wide change, and received recognition through multiple industry awards, these results did not materialise effortlessly, nor did the project follow a smooth, linear path to success. As with many highways initiatives, we encountered a range of challenges and setbacks along the way. However, it was through addressing these challenges that genuine innovation emerged, informing both the development of the test sites and the wider learning now being shared across the sector.

There have been pockets of de-illumination trialled across the UK over the years, even de-illumination at conflict zones, but these have predominantly been driven by cost pressures and have not been researched, or alternatives been proposed. This groundbreaking project is the first of its kind to approach de-illumination from a data driven perspective and driven not by necessity, but by the will to innovate.

The new visual based holistic designs, focused on the road user experience, is true innovation, however it is built on pillars of innovation. With a project such as this there were very few off-the-shelf solutions for data collection and capture. The creation of the thermal imaging-based driver AI behaviour monitoring system has proved a significant challenge and is undergoing constant refinement. Developing this system in conjunction with a Canadian based company has also posed challenges in terms of communication across time zones and data transfer.

In developing the carbon baselining tool, we were aware that several carbon calculators and difference-engine models already exist in the marketplace. However, none offered the specific local authority focus required for this project. Carbon mapping is an inherently complex process, and two significant challenges quickly emerged - each consuming substantial officer time.

First, there is a notable lack of consistent and reliable carbon data within the street lighting sector, creating difficulties in establishing accurate baselines. Second, we identified the issue of comparing assets with differing lifespans, which complicates like-for-like assessments. Addressing these challenges was essential to ensuring that the tool could provide meaningful, representative outputs for local authority use.

Initially we set out the tool to compare against the lifespan of a proposed street lighting replacement scheme, however as we have reached the end of our carbon journey it has become apparent that this may have been the wrong asset on which to focus and that potentially we should have focussed on the asset with the shortest lifespan, given that as that asset comes to the end of its life and at point of decision to replace, then a fresh decision process can be undertaken at the time based on current data as to the most carbon and cost appropriate asset to install.

The third and final major challenge related to the biodiversity monitoring workstream. At the outset, the project significantly underestimated both the pace of development in this field and the associated costs. It was initially assumed that biodiversity monitoring would be a relatively low-cost element of the project, supported by well-established methodologies.

In practice, this proved not to be the case. We quickly identified that audio-based biodiversity monitoring is positioned at the forefront of current research, and undertaking a study of the scale required for this project carries a substantial cost. This shift in understanding required us to reassess expectations and approach the workstream with a clearer appreciation of its complexity and resource implications.

In hindsight, this workstream has required a disproportionate amount of officer time. Given the limited scope of the study we have been able to undertake, the resulting data is unlikely to provide any definitive conclusions. Instead, the dataset is better suited for use in an academic context - particularly by a university research student or even via a citizens science style study - who could undertake a more detailed, methodologically robust study to draw out deeper insights.

If we were to start this project again, we would acknowledge the positive outcomes achieved but also take the opportunity to refine several key elements. In particular, we would restructure the carbon support tool to ensure that grid decarbonisation is fully incorporated across all components, and we would revisit the comparison timelines used within the model to improve accuracy and relevance.

Additionally, we would reposition the biodiversity monitoring workstream at an earlier stage of the project. Establishing a research partnership with a university from the outset would have enabled a more comprehensive and academically robust approach, while reducing the burden placed on officer time and improving the depth of the resulting analysis.

10. Project Manager's Summary

As we bring this project to a close and reflect on the achievements of the past three years, I feel an immense sense of pride - in both the project team and in my own role as Project Manager. The commitment, resilience and unwavering focus demonstrated throughout have been exceptional. From the outset, we recognised that this project had the potential to deliver meaningful, lasting change within the highways sector, and the dedication shown by the team has been fundamental to realising that ambition.

This project has challenged industry perception and challenged beliefs built up over many years that street lighting is a 'must have' safety mitigation and an 'untouchable asset'. In terms of the results we have achieved across the three key aspects of the project, safety, carbon and cost have been nothing short of groundbreaking, bursting the bubble of carbon reduction requiring significant investment.

Through our commitment to detailed, data-led evidence; research grounded in real-world operational experience rather than theoretical modelling; a laser-focused adherence to our stated aims; and consistent engagement with sector partners and communications channels, we have established a robust platform and developed a methodology that can be adopted by any local authority nationwide.

This project and its outcomes have the potential to be applied immediately and see immediate returns for a local authority sector under extreme financial pressure, with the potential to save UK PLC many millions of pounds and break our dependency on lighting as standard. In short, through the outcomes of the project, the specific risk-based approach and upcoming work to affect British Standards, this project has the potential to change the way roads in the UK are built forever.

For a local authority officer, budget holder or decision maker, to use the phrase "it's a no brainer", we urge asset owners to take a fresh look at their lighting stock and lighting policies and explore how they can engage with this project.

Contributors

Karl Rourke
Project Manager – Live Labs 2

John A Lamb
Chair – Academic Assessment & Evaluation Working Group

Helen Jenkins-Knight
Chair – Carbon Reduction & Habitat Working Group

Jon Munslow
Chair – Communications Working Group

Paul Copeland
Chair – Risk & Legal Working Group

Rob Baines
Chair – Street Lighting & Energy Data Working Group

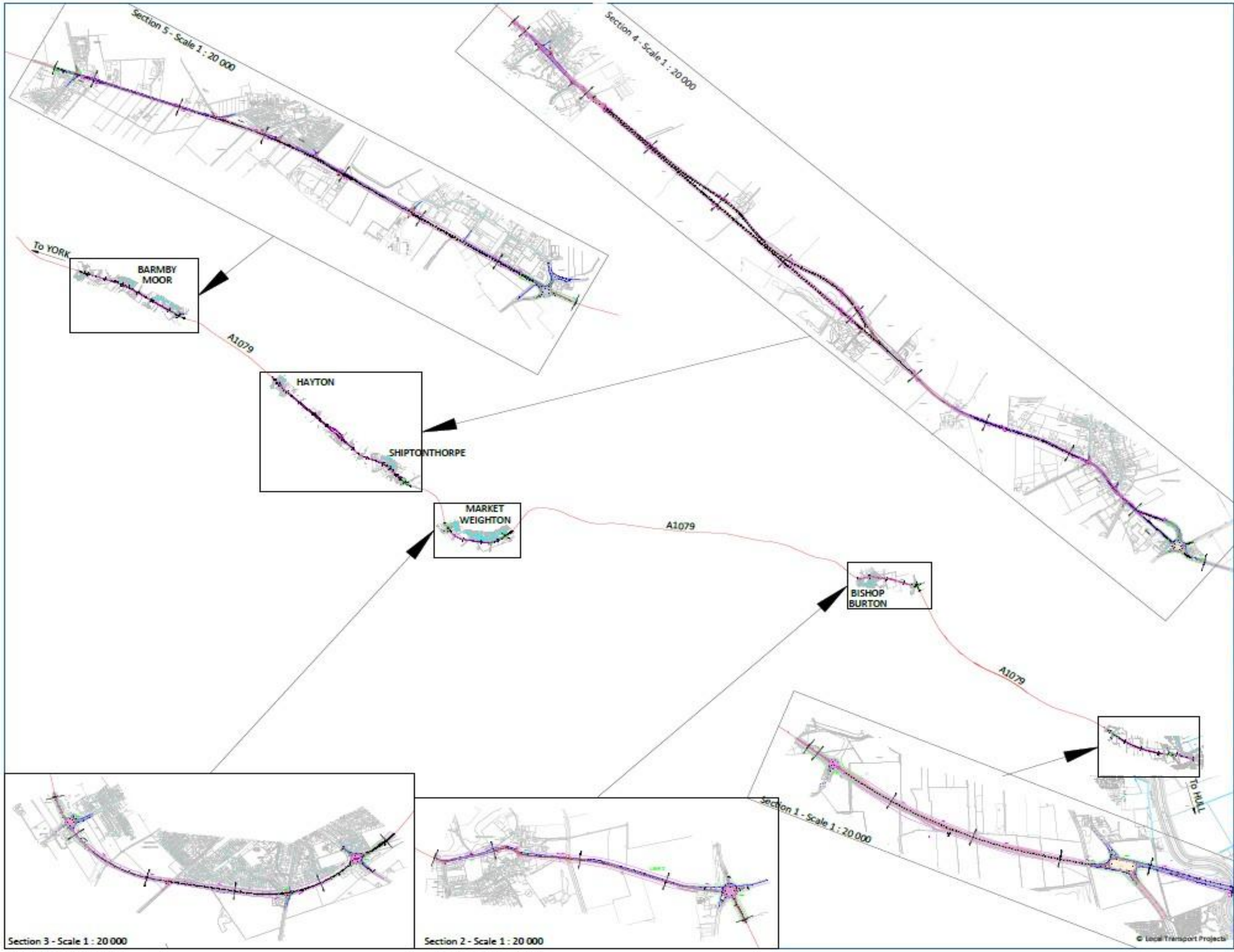
11. Appendices

11.1 East Riding Site Maps

Department for Transport

EAST RIDING OF YORKSHIRE COUNCIL

ADEPT LIVELABS2 Decarbonising Local Roads



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Rev.	Date	By	Chk	Description
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Client
East Riding of Yorkshire Council

Project
Live Labs 2 - Decarbonising Local Roads in the UK
High Visual Efficiency for Low Carbon Lighting

Title
Proposed Interventions - A1079 Route Overview

local transport projects
traffic engineering and transport planning

Armstrong House,
The Flemingate Centre,
Beverley,
East Riding of Yorkshire.
HU17 0NW.

t: 01482 679 911
e: info@ltp.co.uk
w: www.local-transport-projects.co.uk

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	Project	Job	Drawing	Sheet	Revision
LTP	5264	PI	A1079	00	0

11.2 Collision Review

Roundabout

7.9 Safety Data – A164 Node 5 (A164-N5)

7.9.1 PIC data – 10-year PIC data for the A164 / Tranby Lane roundabout (A164 Node 5) is summarised within Table 14.

Table 14: A164 Node 5 (A164-N5) 10-Year PIC Record

Date (Ref)	Time	Severity	PIC Location & Type	Lighting Conditions	Road Surface	Weather	Veh/Users Involved	N° Casualties
05/08/14 (C076314)	07:40	Slight	Location: Swanland roundabout Type: Rear shunt (NB)	Daylight	Dry	Fine	2 cars	1 (car driver)
26/11/16 (131039)	13:00	Slight	Location: Swanland roundabout Type: Rear shunt (SB)	Daylight	Dry	Fine	2 cars	1 (car driver)
30/09/18 (335032)	16:27	Slight	Location: A164 (not at junc) Type: Rear shunt (SB)	Daylight	Dry	Fine	4 cars	3 (car drivers) 1 (car passenger)
09/10/20 (988543)	14:34	Slight	Location: A164 (not at junc) Type: Rear shunt (NB)	Daylight	Wet	Rain	1 goods veh	1 (car driver)
22/10/21 (1101798)	16:33	Slight	Location: A164 (not at junc) Type: U-turn	Daylight	Dry	Fine	1 car 1 PTW	1 (PTW rider)
23/10/21 (1101746)	07:02	Serious	Location: A164 (not at junc) Type: Single vehicle loss of control (NB)	Daylight	Dry	Fine	1 PTW	1 (PTW rider)
02/05/22 (1172036)	21:54	Slight	Location: Swanland roundabout Type: Single vehicle loss of control (SB)	Dark – lights lit	Wet	Fine	1 car	1 (car driver) 3 (car passengers)
22/07/22 (1278279)	18:20	Slight	Location: Swanland roundabout Type: Rear shunt (EB)	Daylight	Dry	Fine	2 cars	1 (car driver)
26/11/22 (1247031)	12:58	Slight	Location: Swanland roundabout Type: Failure to give way	Daylight	Dry	Fine	1 car 1 cyclist	1 (cyclist)

7.9.2 The key findings are:

- 10-year PIC total (average per year) – 9 (0.9);
- KSI PICs – 1/9 (11.1%);
- PIC rate per km – 15.5;
- PICs not in daylight – 1/9 (11.1%);
- PICs not in daylight, rate per km – 1.7;
- PICs not on a dry road surface – 2/9 (22.2%);
- PICs involving vulnerable road users – 3/9 (33.3%);
- Most common PIC type – rear shunt: 4/9 (55.6%).

7.9.3 Video analytics data – *** Awaiting & analysis to follow ***.

Junction

7.14 Safety Data – A1079 Node 5 (A1079-N5)

7.14.1 PIC data – 10-year PIC data for the A1079 / Cliffe Road junction (A1079 Node 5) is summarised within Table 17.

Table 17: A1079 Node 5 (A1079-N5) 10-Year PIC Record

Date (Ref)	Time	Severity	PIC Location & Type	Lighting Conditions	Road Surface	Weather	Veh/Users Involved	N° Casualties
21/06/14 (C035314)	18:45	Slight	Location: A1079 / Cliffe Road junction Type: Failure to give way	Daylight	Dry	Fine	2 cars	2 (car drivers)
21/02/18 (272473)	18:00	Slight	Location: A1079 / Cliffe Road T-junction Type: Failure to give way	Dark – lights lit	Wet	Rain	2 cars	1 (car driver)
09/04/18 (285595)	06:43	Slight	Location: A1079 / Cliffe Road junction Type: Failure to give way	Daylight	Dry	Fog/mist	1 car 1 goods veh	1 (goods vehicle driver)
10/02/19 (814544)	09:25	Slight	Location: A1079 / Cliffe Road junction Type: Head-on	Dark – lights not lit	Wet	Fine	2 cars	1 (car driver)
06/12/19 (906816)	07:10	Slight	Location: A1079 / Cliffe Road junction Type: Failure to give way	Daylight	Wet	Rain	1 car 1 goods veh	1 (car driver) 1 (goods veh)
20/11/22 (1244495)	12:15	Slight	Location: A1079 / Cliffe Road junction Type: Failure to give way	Daylight	Wet	Fine	2 cars	1 (car passenger)

7.14.2 The key findings are:

- 10-year PIC total (average per year) – 6 (0.6);
- KSI PICs – 0/6 (0%);
- PIC rate per km – 42.9;
- PICs not in daylight – 2/6 (33.3%);
- PICs not in daylight, rate per km – 14.3;
- PICs not on a dry road surface – 4/6 (66.7%);
- PICs involving vulnerable road users – 0/6 (0%);
- Most common PIC type – failure to give way: 5/6 (83.3%).

7.14.3 Video analytics data – *** Awaiting & analysis to follow ***.

Crossroads

7.16 Safety Data – A1079 Node 9 (A1079-N9)

7.16.1 PIC data – 10-year PIC data for the A1079 / Sutton Lane / Feoffee Common Lane crossroads (A1079 Node 9) is summarised within Table 19.

Table 19: A1079 Node 9 (A1079-N9) 10-Year PIC Record

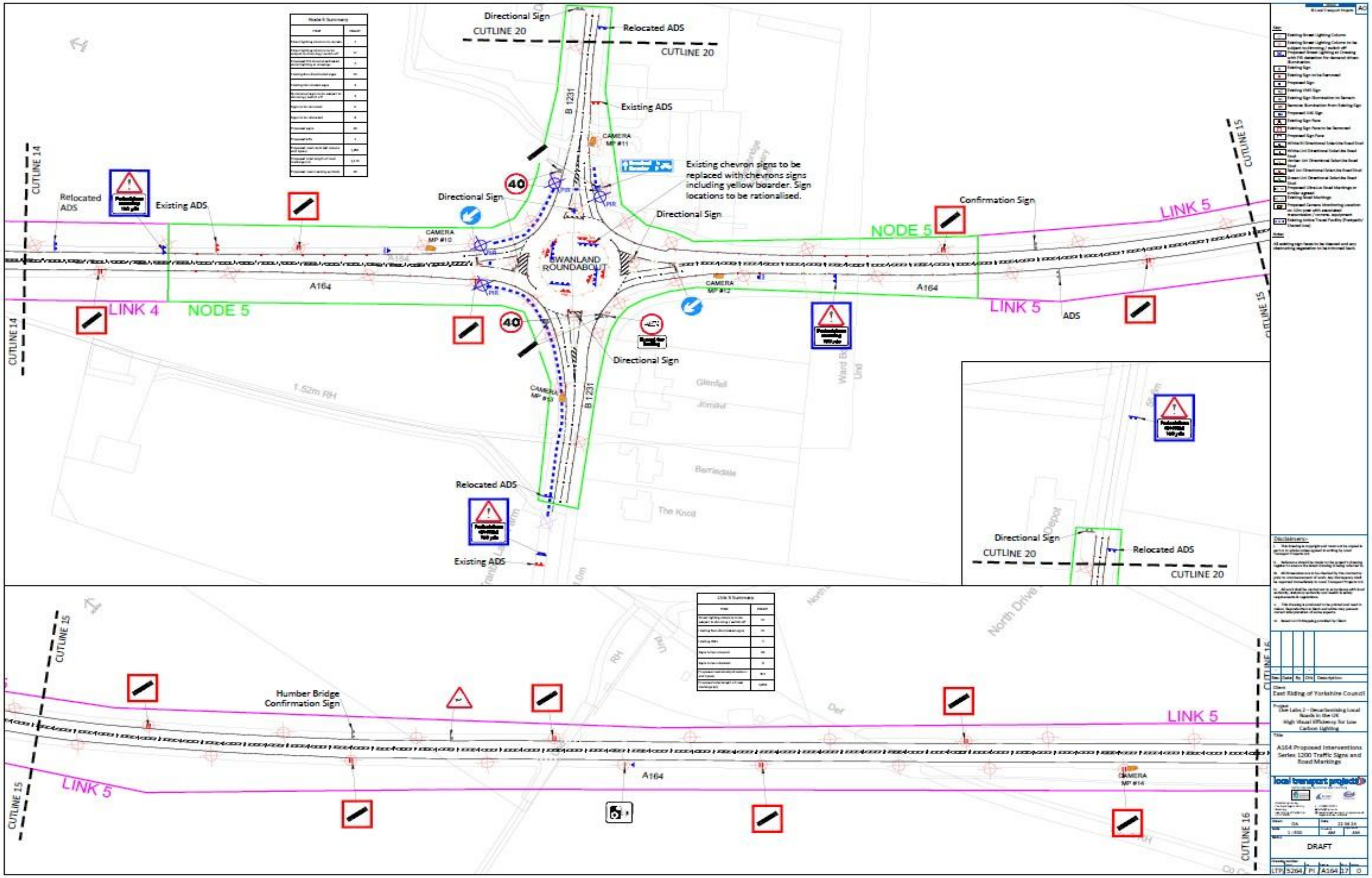
Date (Ref)	Time	Severity	PIC Location & Type	Lighting Conditions	Road Surface	Weather	Veh/Users Involved	N° Casualties
25/09/15 (C063115)	21:50	Serious	Location: A1079/Feoffee Common Ln/Sutton Ln junc Type: Failure to give way	Dark – lights lit	Dry	Fine	1 car 1 agric veh	1 (car driver)
19/04/16 (82378)	18:37	Serious	Location: A1079/Feoffee Common Ln/Sutton Ln junc Type: Rear shunt (EB)	Daylight	Dry	Fine	2 cars	1 (car driver) 1 (car passenger)
29/08/17 (216305)	17:40	Serious	Location: A1079/Feoffee Common Ln/Sutton Ln junc Type: Failure to give way	Daylight	Dry	Fine	2 cars 1 goods veh	1 (car driver)
18/01/18 (346613)	14:21	Serious	Location: A1079/Feoffee Common Ln/Sutton Ln junc Type: Failure to give way	Daylight	Wet	Fine	3 cars	1 (car driver) 1 (car passenger)
09/01/20 (917529)	10:00	Slight	Location: A1079/Feoffee Common Ln/Sutton Ln junc Type: Failure to give way	Daylight	Dry	Fine	2 cars	1 (car driver)
14/06/20 (957591)	14:47	Slight	Location: A1079/Feoffee Common Ln/Sutton Ln junc Type: Failure to give way	Daylight	Dry	Fine	2 cars	2 (car drivers) 2 (car passengers)
08/07/20 (963091)	16:45	Slight	Location: A1079/Feoffee Common Ln/Sutton Ln junc Type: Failure to give way	Daylight	Dry	Fine	2 cars	2 (car drivers) 1 (car passenger)
30/07/20 (968564)	13:15	Slight	Location: A1079/Feoffee Common Ln/Sutton Ln junc Type: Rear shunt (SB)	Daylight	Dry	Fine	2 cars	1 (car driver)

7.16.2 The key findings are:

- 10-year PIC total (average per year) – 8 (0.8);
- KSI PICs – 4/8 (50%);
- PIC rate per km – 15.1;
- PICs not in daylight – 1/8 (12.5%);
- PICs not in daylight, rate per km – 1.9;
- PICs not on a dry road surface – 1/8 (12.5%);
- PICs involving vulnerable road users – 0/8 (0%);
- Most common PIC type – failure to give way: 6/8 (75%).

7.16.3 Video analytics data – *** Awaiting & analysis to follow ***.

11.3 Example site design



11.4 Carbon Results

40 Year (High Uncertainty)

		Total Carbon over the appraisal period (TCO2e)	Carbon per year (TCO2e/year)	% Carbon Change to Existing
Total Carbon	Existing	598.73	14.97	
	Test Bed	1167.85	29.21	95%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11.	643.78	16.099	8%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11 (Design Solution: -12 Studs)	551.27	13.79	-8%
Total Carbon - Links Only (Exc. Ped Lighting Links)	Existing	298	7.46	
	Test Bed	462.71	11.57	55%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11.	243.64	6.089	-18%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11 (Design Solution: -12 Studs)	184.69	4.62	-38%
Total Carbon - Links Only	Existing	383	9.59	
	Test Bed	704.99	17.63	84%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11.	386.86	9.669	1%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11 (Design Solution: -12 Studs)	309.63	7.75	-19%
Total Carbon - Roundabouts Only	Existing	184.3	4.6	
	Test Bed	375.29	9.39	104%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11.	202.45	5.06	10%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11 (Design Solution: -12 Studs)	188.35	4.7	2%
Total Carbon - Junctions Only	Existing	31.43	0.78	
	Test Bed	87.57	2.19	179%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11.	54.47	1.37	73%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11 (Design Solution: -12 Studs)	53.29	1.34	70%

10 Year (High Certainty)

		Total Carbon over 10 years (TCO2e)	% Carbon Change to Existing
Total Carbon Year 10	Existing	467.3	
	Test Bed	349.59	-25%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11.	333.39	-29%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11 (Design Solution: -12 Studs)	299.01	-36%
Total Carbon Year 10 - Links Only (Exc. Ped Lighting Links)	Existing	239.18	
	Test Bed	136.72	-43%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11.	129.91	-46%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11 (Design Solution: -12 Studs)	111.52	-53%
Total Carbon Year 10 - Links Only	Existing	304.28	
	Test Bed	211.89	-30%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11.	203.53	-33%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11 (Design Solution: -12 Studs)	176.84	-42%
Total Carbon Year 10 - Roundabouts Only	Existing	141.59	
	Test Bed	110.44	-22%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11.	103.2	-27%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11 (Design Solution: -12 Studs)	96.1	-32%
Total Carbon Year 10 - Junctions Only	Existing	21.43	
	Test Bed	27.26	27%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11.	26.66	24%
	Scenario - Manufacturing decarbonisation of all studs/E-road markings from Yr11 (Design Solution: -12 Studs)	26.07	22%

11.5 Safety Data

Average Speed

Typology	Sites	Change in Dark Mean Speeds (mph)		
		Before	After	Change
40mph Dual C/Way Link with Ped & Cycle use	A1033 Raich Carter Way - MP#1	34.14	32.47	-1.67
	A164 Green Lane CONTROL - MP#2	36.44	35.27	-1.17
60mph Single C/Way Link	A164 Humber Bridge Approach - MP#14	50.04	57.69	7.65
60mph Single C/Way T Junction	A1079 Cliffe Road - MP#19	40.21	41.47	1.26
4-Arm Roundabout 60mph Long Flared Entry Leg	A164 Riplingham Road Rbt - MP#3	22.41	21.25	-1.16
	A164 Riplingham Road Rbt - MP#5	20.57	18.74	-1.83
4-arm Roundabout 60mph Short Flared Entry Leg	A164 Swanland Rbt - MP#10	19.11	19.05	-0.06
	A1079 Market Weighton CONTROL - MP#15	18.44	18.39	-0.05
4-Arm Roundabout 40mph Entry Leg	A164 Riplingham Road Rbt - MP#6	22.53	22.33	-0.20
	A164 Swanland Rbt - MP#11	19.48	20.05	0.57
	A164 Swanland Rbt - MP#13	20.61	20.31	-0.30
4-Arm Roundabout 30mph Entry Leg	A164 Riplingham Road Rbt - MP#4	19.37	17.10	-2.27
3-Arm Roundabout 40mph Entry Leg	Swanland Dale Rbt - MP#8	19.51	18.94	-0.57
	Swanland Dale Rbt - MP#9	23.91	22.60	-1.31

Department for Transport

EAST RIDING OF YORKSHIRE COUNCIL

ADEPT LIVELABS2 Decarbonising Local Roads

Speed by Vehicle Type

		Articulated HGV		Bus		Car		Motorcycle		Total	
Camera	Monitoring Period	Whole Day	Dark Periods	Whole Day	Dark Periods	Whole Day	Dark Periods	Whole Day	Dark Periods	Whole Day	Dark Periods
MP#1	Sep-24 (Before)	30.4	33.28	32.86	34.07	32.72	34.15	34.24	34.15	32.65	34.14
	Sep-25 (After)	27.76	31.4	31.95	32.49	32.21	32.49	31.65	30.59	32.12	32.47
	Change from Before	-8.86%	-5.65%	-2.77%	-7.75%	-1.56%	-4.86%	-7.56%	-10.42%	-1.62%	-4.89%

Average Daily Users

		Change in Dark Average Daily Users		
Typology	Sites	Before	After	Change
40mph Duel C/Way Link with Ped & Cycle Use	A1033 Raich Carter Way - MP#1	3971	4217	246
	A164 Green Lane CONTROL - MP#2	4099	3804	-295
60mph Single C/Way Link	A164 Humber Bridge Approach - MP#14	1832	1999	167
60mph Single C/Way T Junction	A1079 Cliffe Road - MP#19	1207	2025	818
4-Arm Roundabout 60mph Long Flared Entry Leg	A164 Riplingham Road Rbt - MP#3	1816	2084	268
	A164 Riplingham Road Rbt - MP#5	1970	1942	-28
4-Arm Roundabout 60mph Short Flared Entry Leg	A164 Swanland Rbt - MP#10	1689	1438	-251
	A1079 Market Weighton CONTROL - MP#15	643	1132	489
4-Arm Roundabout 40mph Entry Leg	A164 Riplingham Road Rbt - MP#6	1563	1591	28
	A164 Swanland Rbt - MP#11	1448	1316	-132
	A164 Swanland Rbt - MP#13	1997	1555	-442
4-Arm roundabout 30mph Entry Leg	A164 Riplingham Road Rbt - MP#4	1543	2116	573
3-Arm Roundabout 40mph Entry Leg	Swanland Dalt Rbt - MP#8	889	622	-267
	Swanland Dalt Rbt - MP#9	517	841	324

Collision Rates

After	Location	Dark	Day	Total	
A164	Riplingham Roundabouts	1	2	**3**	**6**
	Riplingham to Swanland		1	**1**	
	Skidby to Castle Hill		1	**1**	
	Swanland Roundabout			**0**	
	Swanland to Humber Bridge Roundabout		1	**1**	
	Willerby Hill to Willerby			**0**	
	Willerby to Riplingham			**0**	
A1079	Raich Carter Way		1	**1**	**6**
	Feoffee Common Lane		2	**2**	
	Hayton		1	**1**	
	Market Weighton Bypass	1	1	**2**	
Total		**2**	**10**	**12**	

Before	A164	A1079
Daylight	79.7%	77.4%
Dark	20.3%	22.6%

After	A164	A1079
Daylight	83.3%	83.3%
Dark	16.7%	16.7%