Summative Assessment: SMART Intelligence Infrastructure Investment Project

A Final Report by Hatch
30th November 2022

Wolverhampton City Council

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1. Introduction

1.1 Hatch was commissioned by the City of Wolverhampton Council to evaluate the SMART Intelligence Infrastructure Investment Project (SI_3). The project is part funded by the European Regional Development Fund (ERDF) and is, therefore, required to submit a summative assessment as part of the project closure procedure.

1.1 The SMART Intelligence Infrastructure Investment Project (SI_3) was conceived as a package of five carbon reduction initiatives, which set out to create a new city-wide network of digital infrastructure to reduce energy consumption, increase renewables and promote behaviour change in multi-modal transport options.

1.2 The application outlines the project's aim to use SMART technologies to reduce carbon, increase renewables and promote behaviour change in the use of multi-modal transport options, including zero or low carbon travel options and active travel. The largest package of proposed works focused on using part of the city's streetlamp network as a basic building block in which to insert SMART technology such as remote control Solar Powered LED lighting, data collection sensors for environmental and traffic monitoring and transmission nodes for the 4G/5G network.

Evaluation Approach

1.3 In line with UK Government (MHCLG, now DLUHC) guidance on summative assessment for ERDF programmes and projects, the purpose of conducting the study is to evaluate the implementation of the SI_3 project, assess its value added, identify the impact it achieved at the city-wide level and draw conclusions about the value for money (VfM) it represents for the investment of ERDF resources and match funding from Wolverhampton City Council (WCC). Summative assessment asks whether the project has delivered performance against intended inputs, activities, outputs, outcomes and impacts. It reviews delivery and management performance with a view to assessing which delivery approaches work and why. This includes identifying any examples of best practice, understanding the delivery challenges experienced, and establishing lessons learnt which could be applied in the design and delivery of future interventions.

1.4 Every summative assessment must cover the five themes below, but be tailored to the project in question:

- **Relevance and Consistency** – considering the context and need for the project and whether and how it has remained relevant and consistent since the project's inception. This requires desk-based review of any changes in the relevant political and economic context, supplemented with strategic consultations.
- **Progress Against Contractual Targets** – measuring performance and understanding progress to date against contracted ERDF expenditure and output targets. This is assessed using project management data, particularly monitoring and claims data backed by consultations to understand any performance issues which arose during the delivery phase.
- **Experience of Managing and Delivering the Project** – capturing the effectiveness of project governance, management and delivery, including key systems and processes. This is tested through consultation, capturing strategic partners' experiences and lessons learned;

- **Project Impacts** providing a summary of project impacts, combining both data and qualitative insights from consultations to understand the outcomes and impacts the project achieves;
- **Value for Money** – assessing the value for money delivered by the project in terms of the outcomes and impacts it achieves against the ERDF and other public sector funding inputs;

Approach to the Summative Assessment

1.5 The summative assessment of the SI_3 project follow the specification set out in the guidance. To complete the assessment, information was obtained from sources including project management data provided by the City of Wolverhampton Council (CoWC), delivery consultations with the project management team, strategic consultations with senior officials and the project's delivery partner (Canal and Rivers Trust), along with desk-based research. This included analysis of:

- **The Logic Model and Theory of Change which underpin the project** – aside from reviewing Wolverhampton City Council background documentation, an assessment and update of the logic model, which underpins the project's intervention logic, was undertaken;
- **Project Performance Data** – detailed analysis of the project's monitoring data to assess performance against contracted ERDF financial and output commitments;
- **Project Delivery Review** – stakeholder consultations with the project delivery team and key strategic partners to obtain feedback on the project's processes, from delivery to management and governance;
- **Consultation** with the relevant project team members across the Council and Rivers & Canal Trust to explore perspectives on project design, effectiveness of management and delivery, /factors affecting project performance and impacts, added value attributed to the project, CCT alignment and future project direction.
- **Value for Money Assessment** – quantitative impact modelling to estimate the key impacts of the project based primarily on reported outputs.

1.6 It is noted throughout the assessment, and it is critical to understanding the context in which the project was delivered, that Wolverhampton City Council and its partners faced some exceptional circumstances during the project's delivery period. The Covid-19 pandemic affected many aspects of the procurement and delivery of project activities, and the resources available to Wolverhampton City Council to manage and implement key project activities. Wherever appropriate in the evaluation, this is reflected in the assessment. In particular, personnel involved in the project's development and the early stages of its delivery left WCC and this presented particular challenges in building a comprehensive picture of the issues that the project team were faced with through these stages.

Structure of this Report

1.7 The evaluation report is structured around the following chapters:

- **Section 2. Project Context** – considers the project's **logic model** alongside the economic and policy context in which it was designed, including the nature of the market

failure, the need for the project and its objectives, and the rationale for the delivery approach;

- **Section 3. Changes to Delivery Context** – considers **changes** both to the project's expenditure and output profile, and to the contextual factors which led to these changes;
- **Section 4. Financial and Output Performance** – assesses **the performance of the project** against its expenditure and output targets;
- **Section 5. Project Governance, Management and Delivery** – provides a more qualitative analysis of the implementation of the effectiveness of **project governance, management and delivery**;
- **Section 6. Outcomes and Impacts** – sets out the progress that the project has made towards the **outcomes and impacts** set out in the project's logic model. An assessment of the project's **value for money**, drawing on the impact analysis, against benchmarked projects is also presented; and
- **Section 7. Conclusions and Recommendations** – outlines the **conclusions** which can be drawn from the evaluation and the **lessons** which have emerged for Wolverhampton City Council as well as for policy makers and those designing and implementing similar projects.

2. Project Context and Rationale

2.1 This chapter sets out the context and rationale for the SMART Intelligence Infrastructure Investment (SI_3) project, exploring how the project was designed to respond to its contextual drivers, market failures, meet its objectives, and deliver its intended outputs and outcomes. The key purpose of the chapter is to understand the relevance and consistency of the project's design and delivery, and whether and how this changed as the context in which it was delivered evolved over time.

2.2 The analysis in this section has been informed by:

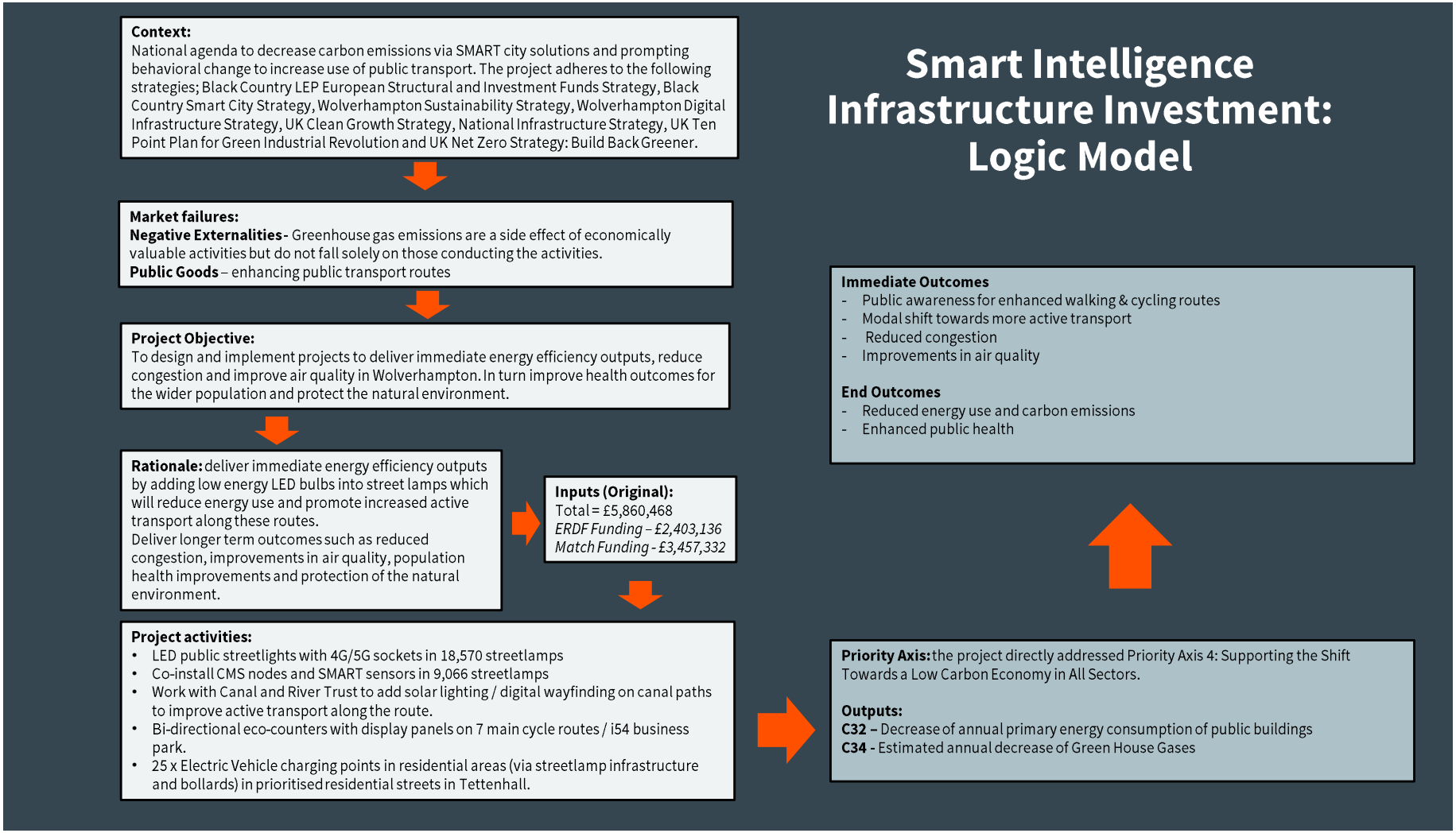
- a review of the project's background documents, including the project's original application form and the contextual drivers set out at the application stage;
- a review of the policy context in which the project was approved and subsequently delivered, assessing how this changed;
- interviews with core members of the SI_3 project management and delivery team.

2.3 In addition to exploring the project's design and tracking through its logic model, the chapter identifies the critical changes in the project's delivery context that occurred from 2020 onwards.

Project Logic Model

2.4 The intervention logic underpinning the need for the SI_3 project is presented in Figure 2.1 overleaf. It summarises the project's context, rationale, objectives, inputs, delivery activities and expected outputs and impacts.

Figure 2.1 Project Logic Model



Source: Hatch, 2022

Strategic Context

Regional and Local

2.5 The project was designed and delivered under the ERDF Operational Programme (2014-20) **Priority Axis 4: Supporting the Shift Towards a Low Carbon Economy in All Sectors**. It was developed by CoWC in response to a call for projects under PA4 (Reference OC01R17P 0661) issued in December 2017 as part of the Black Country's European Structural and Investment Fund Strategy (ESIF, 2016).[1]

2.6 The LEP area and wider regional strategies are important to the context for the project's design and delivery, and to understanding the consistency and relevance of the project's design and delivery with the strategic priorities, challenges and opportunities these strategies identify. A review of the original strategies cited in the project application, and new strategies which have emerged since the project's inception, point to both strong alignment with established priorities and enhanced relevance as the need to tackle climate change has further increased in urgency even since the project was developed.

2.7 **Black Country LEP European Structural and Investment Funds Strategy, 2016[2]:** The project responded to a call through the Black Country LEP's ESIF Strategy. The low carbon economy as an opportunity for growth, the pressing need to reduce CO_2 emissions and the need to invest in energy efficient infrastructure are identified as priority issues in the Strategy. The need to improve the area's blue and green infrastructure is also highlighted as part of both place-making and for its contribution to sustainability in terms of encouraging walking and cycling. Theme 3 (Low Carbon Environment) sets out the Black Country LEP area's approach to ERDF PA4 identifying two Strategic Investment Areas: SIA 3.1 (Improving and Exploiting Our Infrastructure) focuses on blue-green infrastructure (which would include canal infrastructure) with potential measures contributing to increased cycling and walking, and improved quality of life; SIA 3.2 (Supporting Energy Efficiency and the Green Economy) includes commitments to reducing CO_2 emissions and improved energy efficiency. The SI_3 project responded to the priorities set out in both of these SIAs, and the thrust of those SIAs has retained its relevance to the project through its delivery.

2.8 **Black Country Smart City Strategy, 2016**[3]: This strategy set out the area's commitment to an integrated approach to using data and digital technology to achieve CO_2 reductions, meet a wider range of environmental objectives including reduced energy consumption and contribute to economic growth and placemaking. The EU Smart City principles on which it is based underpinned the SI_3 project application and are central to the application of technologies it was intended to deliver.

2.9 **Wolverhampton Sustainability Strategy, 2013**[4]: This strategy sets four priorities including delivering a green economy and achieving sustainable economic development; addressing the causes and effects of climate change and supporting the move to renewable and low carbon energy; protecting and enhancing the environment; and promoting social inclusion and equal opportunities. Provide effective support to deliver a green economy and achieve sustainable

[1] Black Country Local Enterprise Partnership (2016) *Black Country Structural and Investment Fund Strategy*

[2] Ibid

[3] Black Country Local Enterprise Partnership (2016) *Black Country Smart City Strategy*

[4] City of Wolverhampton Council (2013) *Wolverhampton City Council Sustainability Strategy and Implementation Plan, 2013-18*

economic development. Specific priorities are directly relevant to the activities the project was designed to deliver including increasing energy efficiency in public buildings and infrastructure, improving air quality, improving active travel options and improving open space.

2.10 **Future Generations: Our Climate Commitment, 2019[5]:** Having become the first Council in the Black Country to declare a climate emergency in 2019, the City of Wolverhampton Council set out a series of commitments to translate the declaration into the action the Council would take. This include making all Council activities net carbon zero by 2028, with the document setting out a series of measures that are directly relevant to the project. This included a commitment to powering all lighting in Council buildings and street lighting by renewable electricity, installing SMART technology to maximise energy efficiency in Council buildings and that promote more sustainable practices across the city, and measures which support the development of renewable energy facilities.

2.11 **Wolverhampton Digital Infrastructure Strategy (Consultation Draft), 2019[6]**: Activities which are at the core of this strategy are central to the SI_3 project. The strategy is clear that delivering energy efficient infrastructure is a priority, and it directly refers to the potential to upgrade lampposts to enable smart technology applications. This is nested in a strategy which points to the need to roll out full fibre and 5G capability, and to do so in a way that promotes economic growth and improves the lives of residents.

2.12 **Our City, Our Plan, first published 2019, updated 2022[7]**: This is the Council's Plan for the City of Wolverhampton. Climate change (climate conscious) and digital infrastructure (driven by digital) are two of three cross-cutting principles it identifies. There are specific references in the Plan to the type of activities the project would deliver, including support for the rollout of 5G and full fibre broadband to improve digital connectivity for local people (which the infrastructure enables), the delivery of smart technology to improve connectivity and accessibility, support for electric vehicle growth, improved digital infrastructure in the round, and the promotion of more sustainable transport options through the Council's Active Travel Strategy. As part of a 'Good homes in well-connected neighbourhoods' priority, the Plan explicitly refers to the conversion of streetlights to LEDs with smart sensors.

2.13 **Digital Wolverhampton Strategy, 2022[8]:** This strategy was published well after the start of the SI_3 project but is important because it points to the progress the city has made in pursuit of its digital infrastructure objectives and reinforces its importance to future Wolverhampton. The strategy carries forward the linked priorities identified in the 2019 strategy, with individual priorities including digital infrastructure, inclusion, innovation, business and learning, skills and jobs. Its digital infrastructure priority recognises the progress made in rolling out full fibre and the implementation of new systems to support it including streetlights and street furniture, including the use of Small Cells to enable and expand high speed internet coverage. In doing so the strategy points to the potential for energy and carbon savings. In this regard, the project itself is now firmly reflected in a key strategy for the city.

[5] City of Wolverhampton Council (2019) *Future Generations: Our Climate Commitment*

[6] City of Wolverhampton Council (2019) *Digital Infrastructure Strategy*

[7] City of Wolverhampton Council (2022) *Our City: Our Plan*

[8] City of Wolverhampton Council (2022) *Digital Wolverhampton Strategy*

National

2.14 The project is also well-aligned with key national strategies, particularly those relating to climate change and the adoption by the UK Government of its net zero target by 2050.

2.15 **UK Clean Growth Strategy, 2017[9]:** This key national strategy set out an extensive range of 50 policies, proposals and commitments to accelerate the delivery of clean growth, secure economic and social benefit to the UK from it, and limit the cost to taxpayers. Of the many measures it identifies, those of particular relevance to the project include measures to deliver a high-quality EV charging network, investment to make cycling and walking a natural choice for shorter journeys, the implementation of a 'smart systems plan' to save power and its cost, and measures to improve energy efficiency and reduce CO2 emissions in the public sector. Both the objectives of the project as specified in the application and the activities it committed to deliver (Smart Systems, EV charging points, energy efficient lighting, measures to encourage cycling and walking on the canal network) were directly aligned with this strategy. However, as the summative assessment demonstrates not all of these activities were implemented in practice.

2.16 National Infrastructure Strategy, November 2020[10]: Of four priorities identified in the NIS, reference to the commitment to infrastructure delivery that enables the UK to meet its 2050 Net Zero emissions target is the most directly relevant to the project. There is emphasis throughout the strategy on the need to improve energy efficiency (transport, industry, domestic and non-domestic buildings, public buildings to reduce CO2 emissions. The project's objectives and targets are therefore well-aligned with the priorities of the NIS.

2.17 **UK Ten Point Plan for Green Industrial Revolution, 2020[11]:** The Plan sets out the foundations for a green economy and pledges the government's commitment to increasing employment within low carbon industries. The SI $_3$ project is part of a wider suit of smart city projects in Wolverhampton that work together to create carbon efficiencies in the region.

2.18 **UK Net Zero Strategy: Build Back Greener, October, 2021[12]:** The UK Parliament implemented legislation requiring the government to reduce the UK's net emissions of greenhouse gases by 100% (relative to 1990 levels) by 2050. In response to the UK target, CoWC have set out a commitment to become carbon neutral by 2028. The introduction of the UK and CoWC net zero targets demonstrate that carbon reduction projects like SI_3 have become increasingly relevant to support this ambition, through increasing energy efficiency and reducing the GHG emissions generated by the Council's infrastructure and its delivery of services.

Market Failures and Demand Drivers

Market Failures

2.19 Two market failures were identified in the project's ERDF application.

2.20 **Greenhouse Gas Externalities**: The simple principle that CO2 and other greenhouse gas emissions are negative externalities of economic activity was cited by the applicant as the first of two core market failures that provided the rationale for the project. It is now widely

[9] HM Government (2017) *The Clean Growth Strategy: Leading the Way to a Low Carbon Future*

[10] HM Treasury (2020) *National Infrastructure Strategy: Faster, Fairer, Greener*

[11] HM Government (2020) *The Ten Point Plan for a Green Industrial Revolution*

[12] HM Government (2021) *Net Zero Strategy: Build Back Greener*

acknowledged that greenhouse gas emissions are globally the most serious and challenging form of negative externality, that is, that the social costs of CO2 emissions are not internalised or borne by the producer or by users, although both will experience the consequences of climate change. Mechanisms to establish a price for CO2 emissions have been slow to emerge and are highly complex to impose.

2.21 This market failure requires a policy response and public sector intervention, since the market price of goods and services does not capture the full cost to society. In the case of this project, this represents a strong rationale to direct ERDF and other public sector resources at measures which will contribute to reducing CO2 emissions.

2.22 The ERDF application also cites **imperfect information** as a relevant market failure. This market failure centres on producers and consumers lacking the information required to make an informed or rational decisions, militating against investment and innovation since the costs and benefits and costs of action are not fully understood and can readily be priced. Given the pace at which technology to tackle CO2 and other emissions is moving, and the nature of the negative social costs of CO2 emissions, this is a reasonable part of the rationale for the project.

2.23 The application does not cite a **public good** rationale, but this would also be relevant. The focus of the project is on social and community infrastructure (ie street lighting, walking and cycling network, city management systems) for which the public sector is responsible. The use of this infrastructure and the CO2 emissions it generates cannot easily be priced and charged to users, and the social benefit of more energy efficient and CO2 limiting technologies are essentially shared.

2.24 The market failure rationale for the project was clearly defined at the outset, drawing on now globally accepted grounds for public intervention to tackle the critical problem of CO2 emissions and global warming. If anything, the effect of these market failures and the urgency with which they need to be addressed has strengthened over the short lifetime of the project as the impacts of climate change become increasingly apparent, and the need for immediate action gathers further momentum and reinforces the grounds for public sector intervention to tackle the underlying market failures.

Demand Drivers

2.25 Demand drivers identified in the project application are a mix of technology and policy-led requirements centred on CoWC and its partners intent to become a Smart City, the contribution this would make to meeting targets for reductions in carbon dioxide (and other) emissions, and related evidence about the need to encourage a mobility shift to address urban transportation and congestion issues in the city. As such, the project's design was not explicitly based on demand projections for a service or usage of specific technologies, but on evidence about what was necessary to support Smart City objectives and contribute to positive change.

- **Demand for Low Carbon Initiatives**: The application cited the Low Carbon chapter of the Industrial Strategy and its commitment to reduce emissions by 26% by 2020, and by 80% by 2050. It noted the estimated cost of unchecked climate change cited in the 2006 Stern Report (5-20% of global GDP per annum) versus the cost of tackling emissions at 1% of GDP.
- **Demand for SMART Mobility**: As Wolverhampton's population continues to grow, this puts pressure on transport and other city infrastructure. The adoption of smart technologies is part of the city and the wider area's strategy to manage growth and increased demand efficiently and sustainably. Measures to encourage active travel

(walking and cycling) were part of the project's proposed activities, whilst the focus on city street lighting and technologies to improve the management of this essential infrastructure were central to the project's objectives. Baseline evidence was provided which showed, for example, that 13,086 cycle journeys were made in 2017, with simple assumptions made about the potential saving that represented in CO2 emissions compared with the case if those journeys had been made by car. This was cited as justification for the proposed investment through the project in solar lighting on canal towpaths to encourage cycling, and related measures to promote active travel to the city's residents.

2.26 It is perhaps a limitation of the project application that its key demand drivers were qualitative rather than quantitative. However, in terms of the key activities that were subsequently delivered, including the large-scale switch to LED lamps and the installation of solar lighting by the Canal and River Trust, some further clarification about the baseline position was provided by the project and is reflected in the assessment of outputs and impacts.

Project Objectives and Activities

2.27 In the context in which the project was developed and the needs to which it responded, the headline objective identified in the project application was to create 'a new city-wide network of digital infrastructure to reduce energy consumption, increase renewables and promote behaviour change in multi-modal transport options'. Whilst it is not described explicitly as an objective, this is the overarching statement that describes the purpose of five related initiatives which are the focus for the project's activities:

- Installation of 18,570 LED street light bulbs to replace existing sodium bulbs, reducing energy consumption and related CO2 emissions. It is clear from the evaluation that this was the major activity ultimately delivered by the project;
- Connecting new LED streetlights to a central internet-based management (CMS) system to enable system monitoring and management, including remote controlling, to underpin increased energy efficiency;
- Installation of 25 on-street residential EV charging points in Tettenhall to support the uptake of EVAs and link their installation and use to an open data platform;
- Co-installation of multi-use sockets on the 18,570 street light columns to enable the installation of data collection sensors (air quality and traffic monitoring; install 9,066 light sensors and 250 temperature sensors to enable the remote controlling of lights and the direction of city services; addition of 9,066 transmission nodes for 4G/5G capabilities; provide a central data hub to integrate data from the sensors.
- Installation of 10km of solar lights in what are described as the city's most polluted locations to generate energy and encourage walking and cycling on canal towpaths. This would be further supported by 130 digital wayfinding points (covering 20 km) and bi-directional eco-counters on 7 cycle routes to the city centre and i54 business park, together with the provision of live data on bike hire and EV charging points. This would also contribute to CO2 emission savings.

2.28 Delivery of these activities (principally capital equipment) would be led by City of Wolverhampton Council, with revenue to support the installation of the infrastructure. Installation of the solar lighting and digital wayfinding would be procured and installed by CoWC's partner, the Canal and River Trust.

Project Milestones

2.29 The project's Grant Funding Agreement for ERDF was signed by the Managing Authority (Ministry of Housing, Communities and Local Government) in July 2019, although the start of the project's investment period was April 2019. A project phasing plan set out the key actions, timings and duration of activity and is shown in Table 2.1 below. At the outset it set an achievable schedule of preparatory, procurement and delivery activity, reflecting a relatively straightforward series of equipment procurements and installations which would draw on the resources and expertise of Wolverhampton City Council and its partner organisation the Canal and River Trust.

Table 2.1 Project Milestones at Grant Funding Agreement

Phase	Action	Duration	Dates
Pre-Start Up	Procurement tender specs developed and issued	4 months	Jan-Apr 2019
	Preparation of recruitment paperwork		
	Establish governance board		
Start Up Phase 1	Recruit Project Manager	8 months	Apr-Sep 2019
	Collect baseline data and audit data		
	Award tenders and contract with suppliers		
Delivery Phase 2a	Procure Central Management System	6 months	Apr-Jun 2020
	Install LED lights, nodes, sockets and digital capture sensors		Oct 2019-Apr 2020
	Install EV live data sensors, cycle counters, display panels		June-Dec 2020
	Commence data capture and monitoring		
Delivery Phase 2b	Install solar lighting on canal towpath sections	12 months	Apr 2019-Mar 2020
	Install waymarking with QR codes and data sensors		
Delivery Phase 3	Install LED lighting with sockets, sensors and nodes	12 months	Apr 2020-Mar 2021
	Monitoring and data capture		
	Install waymarking with QR codes and data sensors		
	Install residential EV charging points in 4X streets in Tettenhall		
Delivery Phase 4	Install LED lights and digital capture sensors	12 months	Apr 2021-Mar 2022
	Install data hub to coordinate data		
	Set up open platform for data access		
	Ongoing monitoring and data capture		
Completion and Closure	Evaluation/summative assessment	12 months	Jan-Mar 2022
	Data capture for outputs comparison year		
	Reporting		
	Final claims		

2.30 The assessment explores how the project performed against this initial delivery schedule and the reasons for delays and changes that occurred between 2019 and 2022. As the report explains, the Covid-19 pandemic which took hold in early 2020, related difficulties in recruiting

and retaining staff, and challenges relating to some of the core technologies the project intended to install, had a significant bearing on this implementation schedule.

Project Inputs

2.31 The project identified an investment requirement of £5,860,468. The application sought ERDF investment totalling £2,403,136 at an intervention rate of 42%, with CoWC contributing £3,457,332 in match funding. The capital and revenue break down with funding sources is shown in Table 2.2 below.

Table 2.2 Project Funding

Source	Capital/Revenue	Total (£ million)
ERDF	Capital	2.093
	Revenue	0.310
	Sub-Total	2.403
City of Wolverhampton Council	Capital	2.940
	Revenue	0.517
	Sub-Total	3.457
Total	Capital	5.033
	Revenue	0.827
Overall Total		**5.860**

Source: City of Wolverhampton Council

Project Outputs

2.32 The project would deliver outputs C32 and C34 in line with the relevant priority axis (4E).

- **C32 Decrease of annual primary energy consumption of public buildings**: C32 would be achieved by a decrease in energy consumption as result of converting older, energy intensive, street lighting to new LED lanterns. The basis for the calculation was a unique charge code for all lamps that indicated the kilowatts (KW) per hour (kWh, and data from specialist organisations and the Council's unmetered electricity administrator (Power Data Associates) using those charge codes and burn hours. The ERDF project manager would receive a report enabling them to estimate from the reports for individual lamps the difference between the energy consumption of old and new lamps, and by this means the monthly energy decrease. The contracted total for C32 was 6,642 (kWh) based on 2,607 in 2020 and 4,035 in 2021.
- **C34 Estimated decrease in Green House Gases:** C34 relates to the resulting decrease in GHG (greenhouse gases) achieved as a result of the street lighting conversions. C34 outputs would be measured by calculating the carbon savings using an accepted conversion factor provided by BEIS which is 0.25091 for 2020/2021.[13] To calculate the carbon dioxide emissions savings (tonnes of carbon), a formula would be used in which the kilowatt hours (kWh) saved was converted to tonnes (multiplied by 0.001) and then multiplied by that factor. The figures contracted for were 2,311 tonnes saved in 2020 and 2,761 in 2021, a total of 5,072, based on information reported in the project's Results and

[13] Greenhouse Gas Reporting Conversion Factors https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2020

Outputs Annex. There is a lack of clarity in the GFA about how exactly the 5,072 tonnes figure was calculated. It appears to be a combination of estimated annual CO2 savings plus a small additional factor relating to the CO2 savings that additional cyclists would generate. This is not clear, and it has not been possible to verify this assumption.

2.33 It should be noted that subsequent Project Change Requests (PCRs) resulted in substantial changes to the relevant target figures. These are discussed at greater length later in the assessment, since they were driven in large part by factors affecting the initial delivery of the project. However, for C32 they also stemmed from an error in the calculation of energy savings from the replacement lamps. In the contracted outputs, the figure of 6,642 was based only on one lamp of each type being included, rather than the actual number of lamps.

Outcomes and Impacts

2.34 The project application identifies a number of outcomes the project expected to achieve:

- Reductions in congestion in Wolverhampton, driven by the project's objective of encouraging more residents to cycle or walk to work, education, leisure etc and by the application of smart technologies enabled by the project to better manage movement.
- Improvements in air quality, with the project application identifying in particular Nitrogen Oxide (associated with vehicle emissions) and with the project targeting infrastructure on canalside towpaths in the city centre, Horseley Fields, Wolverhampton Science Park to the railway station and Bradley Arm which were priority areas for the city's Air Quality Management strategy. The intent was for the project to encourage longer use of this infrastructure by installing lighting and wayfinding. The GFA signalled that monthly collection of Nitrogen Oxide and other emissions data would be carried out.
- Improved health through the reduction in ill-health caused by emission and through the use of healthier, active travel walking and cycling options. There were references in the application improved life expectancy and quality of life.
- The related benefits to the city's natural environment associated with reduced pollution.

2.35 Beyond these specified outcomes, it is important to underline that the project's design and the proposed activities for investment were part of a wider strategy to future proof the city for the roll out of smart technology, using the infrastructure paid for in part by the project to provide the platform to do this through the installation of smart enabled sockets, nodes and sensors. In this regard, there were longer term objectives for change which the project would enable, focusing on the application of new technologies and their roll out to underpin changes in behaviours and the management of the city.

2.36 There was a lack of detail and clarity in the application about what key measures of socio-economic change might be used to capture project outcomes. Whilst the indirect benefits of investments in energy efficient infrastructure, smart technologies and measures to encourage active travel are challenging to quantify, the application lacked specificity about how such changes might be measured and a sense of the scale of change which might be achieved.

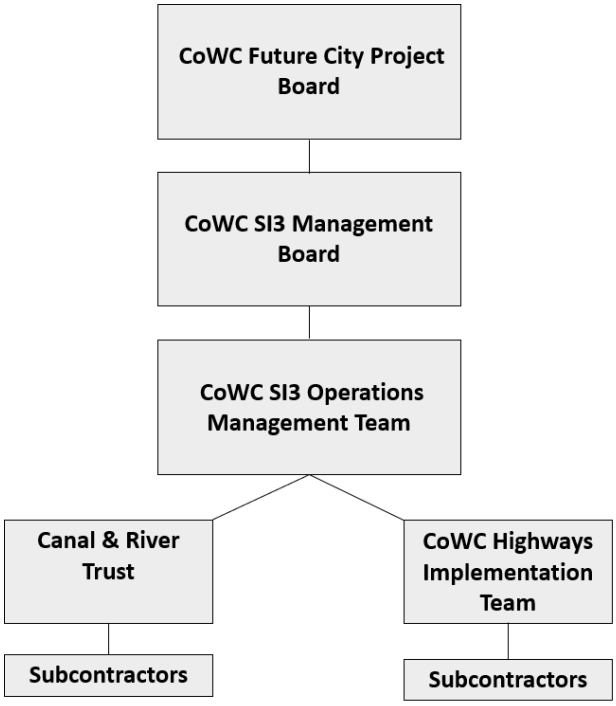
Governance and Management

Project Governance

2.37 The Grant Funding Agreement specify that the SI_3 project would be led by the City Environment Team in the Place Directorate at CoWC. It described the intent to establish a Management Board of key officers, including an ERDF Project Manager, to run the project. This would report upwards to the CoWC's Future City Project Board, identified as the key strategic body in the governance arrangements. Delivery of the project's key activities would be led by CoWC's Highways Implementation Team and the Canal and River Trust for the solar lighting and wayfinding activities, with the latter responsible for the canal-based infrastructure.

2.38 An organogram of governance and reporting lines set out in the GFA is shown in the diagram below.

Figure 2.2 Proposed organogram outlined in the SI_3 Project application to ERDF



Source: Hatch, 2022

2.39 The City of Wolverhampton Council was experienced in the management of ERDF projects and the arrangements identified in the application reflect this. Recruitment of an ERDF project manager would be backed by support from a central project and programme team with extensive experience in ERDF including compliance and audit requirements. Evidence presented in the application pointed to the key personnel having many years' track records of developing and delivering programmes and projects. Similarly, the identified Canal and River Trust lead was also an experienced programme and project manager, with training in ERDF technical assistance.

2.40 The project would also benefit from its governance and management arrangements being nested in the services responsible for delivering both the specific project activities and the wider programme of investment across the city relating to smart technologies and place-making.

Reference to a working group who developed the application described senior personnel including the Head of Local Economy, Head of City Transport, Sustainability Manager, Strategic Lead for City Economy and other officers representing procurement, finance, transport strategy, corporate projects and programmes.

Summary

2.41 There was clear coherence in the SI_3 project's intervention logic, its design and the ways in which this reflected the strategic context at the time of its development. It responded both to environmental policy drivers and the city of Wolverhampton's smart city ambitions, and this was carried through into the design of its activities.

Environmental policy imperatives were strong (and have strengthened further)

2.42 Our review of relevant local, regional and national strategies demonstrates that the project's design was clearly consistent with priorities for the development of the low carbon economy and the pressing need to tackle CO2 emissions. This was central to the project's intervention logic, and guided the activities to which the CoWC and its partner the Canal and River Trust committed. The project was therefore able to demonstrate strong alignment with the relevant priorities of the Black Country EUSIF and with other key strategies published around the time of the application.

2.43 If anything, this strategic context was reinforced even before the GFA was approved with the UK Government through 2019 and 2020 making a series of commitments to the low carbon economy and to accelerating progress towards substantial CO2 reductions. In this regard the project could be seen as timely and an example of the type of actions that public bodies would be increasingly expected to take to tackle climate change.

Well-rooted in Wolverhampton smart city objectives

2.44 Alongside environmental policy drivers, there was also a clear smart city technology logic to the project's design, grounded in digital infrastructure strategies for Wolverhampton. This was already established as a priority for CoWC, and the project's design benefited from being positioned as part of a wider suite of activity intended to build the technological infrastructure to operationalize smart city principles. There was emphasis in the project's design on an integrated approach to providing this infrastructure and on future proofing that infrastructure so that it was flexible and adaptable as other components of the smart city programme were rolled out.

2.45 Consultations with the project's senior delivery team also underlined the extent to which smart city and environmental objectives were mutually reinforcing. There were clear understandings, reflected in the application, that the roll out of smart technologies would better enable Wolverhampton to meet its objectives regarding energy consumption and CO2 emissions reductions.

Clear market failure rationale

2.46 The application clearly articulated the market failure rationales that justify public sector intervention of the type proposed by the project. The social cost of greenhouse gas emissions are externalities for which only limited progress has been made in pricing them and passing the cost to domestic or industrial emitters. For smart technologies which are fast evolving and still

relatively novel in UK cities, and for technologies and activities which will reduce CO2 emissions, there is not yet sufficient information for consumers or businesses to make rational choices and no established means of valuing the social costs and benefits of action.

Lack of specificity about some project targets

2.47 The project itself recognized at an early stage that the target outputs to which it committed in the GFA were not sufficiently clear and there were errors in the calculation of these targets. Detail about the project's outputs, the baseline position against which progress would be measured and how progress would be measured were a weaker point of the application. Whilst it should be recognized that the types of behavioural change the project sought to encourage (eg. switch to active modes of travel) are difficult to predict, the application would have benefited from more specificity about individual measures of change, and how this might be reflected in key socio-economic indicators to capture the project's outcomes and impacts over the medium to longer-term.

Comprehensive approach to governance and management

2.48 The proposed governance and management arrangements for the project anchored it in structures that appear to have been both tried and tested in terms of delivering ERDF projects, and which aligned well functionally with the activities to be delivered, in particular transport. This reinforces the extent to which the project appeared to be well-integrated into a wider set of strategic priorities for CoWC relating to the smart city initiative and its objectives for transport and mobility.

2.49 Post-GFA and through the initial stages of the project's delivery, several factors combined to result in some significant changes to the delivery context. The number and impact of these changes is such that their implications for the continuing relevance and consistency of the project is considered separately in Chapter 3.

3. Changes to Project Delivery Context

3.1 This chapter explores the factors which quickly changed the context in which the SI_3 entered its implementation phases and which had wide ranging impacts on the project as it progressed. The chapter considers the extent to which the project retained its consistency and relevance as the external context changed, which in turn had an important bearing on the timing and range of activity delivered and how the project was managed. This included the submission and agreement by the Managing Authority of two project change requests (PCR).

External Context

3.2 Almost immediately following the project's start-up, several factors began to exert influence on the progress that CoWC made in establishing the project management team, procuring equipment and overseeing its delivery.

Covid-19 Pandemic

3.3 The project commenced its delivery phase in early 2020 after a period in the latter half of 2019 during which the recruitment of the ERDF project manager proved to be particularly challenging, and which contributed to delays in the initial phase of the project. From early 2020 and especially from March 2020, the global Covid-19 pandemic resulted in unprecedented restrictions, the effects of which were as follows:

- Imposition of lockdown restrictions in the UK which resulted in CoWC and Canal and River Trust personnel being unable to work in offices, to spend time on sites and where social distancing measures had a significant and negative impact on the ability of the project team to carry out practical tasks. Consultations with the project delivery team confirms that there were immediate and significant challenges to CoWC in moving forward with the project, including the procurement of equipment and its installation. This resulted in the submission of PCR later in 2020.
- The instigation of furlough measures by private companies through mid-2020 as the initial shock of the pandemic affected business performance, and which had a knock-on effect on normal procurement and business engagement practices.
- The start of a lasting, adverse effect on global supply chains and the movement of goods and materials within and into the UK. This exacerbated existing problems with the availability globally of semi-conductors for microchips, key components of some of the technology the project proposed to deliver.

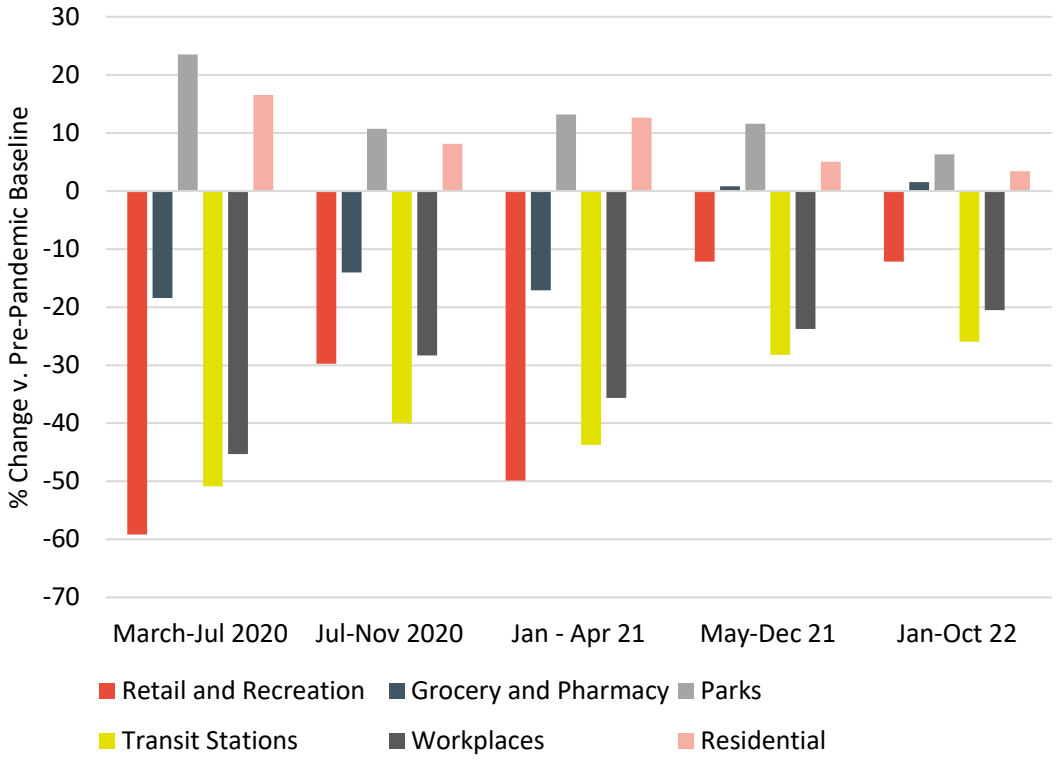
3.4 The extent to which the city of Wolverhampton was affected by the pandemic (in common with much of the UK, is reflected in mobility data which shows how movements for various purposes (shopping, leisure, travel to work, outdoor activity, residential) changed over time compared with pre-pandemic levels. The Google community mobility data points to sustained and prolonged falls in trends for retail and recreation, grocery shopping, travel to work and the use of transit stations. The data suggests that such movements fell sharply through 2020, recovering through the latter part of 2021 as lockdown restrictions and ongoing public concern about movement eased.

3.5 However, even through 2022 the data suggests that, for some types of movement – particularly the use of public transport stations and travelling to work – the pattern has not yet returned to pre-pandemic levels. This is likely to reflect underlying and possibly lasting changes in terms of

a switch to hybrid working or working at home and lasting concern about the use of public transport.

3.6 By contrast, the data suggest that outdoor spaces and the ability of people to walk (or cycle) for exercise became more important during the pandemic and has continued to be higher than the pre-pandemic baseline through 2022. Whilst it is too early to conclude that there has been a permanent change in behaviour, the data reinforces the emphasis on the need to encourage active travel, improve the infrastructure to support this, and address barriers including congestion, air quality and safety, all of which were underlying purposes of the project. In this regard some of the main impacts of the pandemic on the city increased the project's relevance.

Figure 3.1 Community Mobility Change v. Pre-Pandemic Levels, City of Wolverhampton



Source: Google, COVID-19 Community Mobility Report

Worldwide Microchip Shortage

3.7 The Covid-19 pandemic was also in large part the trigger for a global microchip shortage that emerged through 2020. Substantial additional demand for computer hardware that resulted from the shift to homeworking saw demand outstrip the industry's capacity to supply them, leading to rising prices and shortages for manufacturers.[14] The issue was exacerbated by the effects of restrictions on the shipping of goods globally linked to movement constraints.

3.8 For the SI_3 project, the project delivery team made it clear to the evaluation that this led to its inability to procure one of the key pieces of capital equipment: the Central Management System.

[14] JP Morgan Research, Aug 2022 Supply Chain Issues and Autos: When will the Chip Shortage end? (How Long Will the Chip Shortage Last? | J.P. Morgan Research (jpmorgan.com)

We comment in Chapter 5 on the implications of this issue for the delivery of the project and its ability to meet its targets.

The UK's Exit from the EU

3.9 January 2021 saw the UK agree a post-Brexit trade deal with the EU enter into force. Whilst it is difficult to attribute difficult to attribute specific issues that arose in the delivery of the project to that transition point and its impacts, nationally there were widely reported issues faced by businesses in switching to new import and export rules, and evidence of significant delays, higher costs and difficulties for businesses in sourcing goods and materials through 2021. Again, these were exacerbated by the effects of the Covid-19 pandemic which had seen a slow return to normal trading and movement conditions for businesses.

3.10 Disruptions to supply chains are understood to have been cited as a factor by the project delivery team when it sought to procure the CMS, although it is outside the scope of the evaluation to understand precisely how this affected potential suppliers of that equipment.

Tackling Climate Change

3.11 Chapter 2 points to a series of national, regional and local strategies on tackling climate change and the low carbon economy that were published after the project application was completed. This signalled what has essentially been a continual and important change in the policy context as the global imperative to respond to and manage climate change intensified through the early part of this decade. The UK Government's commitment (June 2019) to reduce the UK's greenhouse gas emissions (net) by 100% compared with 1990 levels by 2050, legislated for in Parliament and a focal point of its 2021 Net Zero Strategy is a good example of how the national policy landscape has moved.

3.12 Internationally, the Glasgow CO26 (Conference of the Parties to the UN Framework Convention on Climate Change), held in 2021, saw 200 states commit to maintaining the objective of limiting global warming to 1.5 degrees Celsius and to national actions to reduce CO2 emissions. Whilst the strength of the commitments and progress are uncertain, the 2020s has seen recognition that the issue needs urgent and immediate action. The climate change imperative has therefore become even stronger during the short period over which the project was delivered with the need for action that achieves rapid results in reducing CO2 emissions. In this regard, the project's relevance has been enhanced as pressure grows to take decisive, practical action to reduce emissions.

Internal Factors

3.13 Consultations with the project delivery team pointed to several key challenges which influenced the progress made, particularly in its early stages. To some extent these were driven by the unprecedented effects of the Covid-19 pandemic and its impacts on both the CoWC team and the ability of the project to procure equipment and deliver it. However, they had an important bearing on the project's overall progress and as such are critical changes in its context.

Personnel changes at CoWC

3.14 The Covid-19 pandemic is now widely accepted as having contributed to difficult labour market conditions which had some specific impacts on the management of the project and the delivery of its capital works. Initially through the latter half of 2019, the project was run by a team of CoWC officers experienced in both ERDF and the delivery of capital projects. This was an interim

step as it initially proved difficult to recruit a specialist ERDF Project Manager with the required skillset to the post. After a lengthy recruitment period a Project Manager joined the team in January 2020. How far this was an effect of the pandemic is unclear and could not be determined through the consultations. Local government in the UK has faced an extended period of spending restraints and cuts, and there are acknowledged to be challenges in recruiting to specialist roles of this type. However, it is likely that the disruptive effects of the pandemic contributed to the delay. The ERDF Project Manager left CoWC in July 2021, well before the completion of the project. This led to a second recruitment process to find a replacement.

3.15 The team experienced similar issues with recruitment, but a second manager was employed in January 2022. Consultations suggest that there were similar challenges faced by CoWC in identifying and securing that appointment. In the event, the replacement remained in post only until April 2022 after which the post remained vacant until the end of the project.

3.16 The CoWC responded by covering the project management function through its Project Sponsor, an individual with substantial ERDF experience, who took over day-to-day management responsibility backed by the directorate's wider project management resources. How these issues affected the delivery of the project is explored in more detail in Chapter 5, but they are contextual changes which must be recognised.

3.17 Consultations also point to related challenges for the Council's Highways team who had lead responsibility for the installation of the replacement LED lamps. It is understood that several lighting engineers left the organisation during the delivery period which slowed progress in fitting the equipment. The team's lead officer left CoWC in June 2022 but was replaced by another member of the same team who had worked on the project and so there appear to have been no significant issues with delivery at this stage. In any event, this was close to the completion of the installation process. How far the departures of key staff were linked to the pandemic could not be determined through the consultations, but it is symptomatic of flux in the labour market that is now widely recognised to have been one of its impacts.

Challenges to procurement and installation of equipment

3.18 Several challenges to equipment procurement were highlighted in consultations which were directly attributed to the impacts of the Covid-19 pandemic. Specific issues included:

- Respecification of LEDs. Following the delays to the start of the project, it is understood that the Council revisited its procurement specification for the replacement LED lamps. We cannot attribute this particularly decision exclusively to the pandemic, but it is a risk that arises with the delivery of many new technologies when those technologies are continually evolving, and is likely to have been exacerbated by impacts on suppliers as the UK entered lockdown.
- The selected supplier of LEDs stopped production of bulbs at the start of the UK lockdown and this also contributed to delays in securing and installing supplies.
- The loss of Council engineers to install lamps and the delays to the project saw the Council opt to appoint agency contractors to bolster its team. This affected the split between the salaries budget and professional fees in the project's costs.
- There were also restrictions on the movement of personnel involved in the installation process resulting from social distancing requirements. This also contributed to delays.

3.19 How the Council managed these challenges, and how they affected the project's performance is explored in more detail in Chapters 4 and 5.

Project Change Request

The outcome of the challenges that CoWC faced was the need to submit two separate Project Change Requests (PCR) for approval by the Managing Authority. Key details of the PCRs are summarised below, and their impacts on project delivery are explored in greater detail in Chapter 5.

PCR 1

3.20 The first PCR was submitted to the Managing Authority in late 2020, and agreed in December 2020, with CoWC citing difficulties procuring equipment and the resources available to it to install them as reasons for the request. In addition, the Council pointed to administrative delays in signing the GFA, although it has not been possible to pinpoint the reasons why the GFA took longer to approve than anticipated.

3.21 The outcome was an approved request to extend the project's completion date by 3 months (March 31 to June 30 2022), to reduce CoWC salary expenditure (for its installation team) and to reallocate that revenue to professional fees in the form of agency support for installation. It should also be noted that there were substantial changes to the project's target outputs and their profile compared with the GFA. These are shown in Table 3.1 below.

Table 3.1 Output Revisions, PCR 1

Total	GFA	PCR 2020	Change (no):	% Change
ER/C/O/32 Decrease of annual primary energy consumption of public buildings (kWh)	6,642	2,977,264	2,970,622	448%
ER /C/O/34 Estimated annual decrease of GHG (Tonnes)	5,072	747	-4325	- 85%

Source: CoWC, 2020, Project Change Request Application and Assessment Form.

3.22 There was a substantial increase in the energy consumption output (C32) which reflected an error in the calculation that underpinned the GFA. The GFA had assumed the installation of only 1 type of each lamp in calculating the saving, rather than driving the output estimate by the proposed number of lamps in total.

3.23 There was also an error in the GFA's estimate of the decrease in greenhouse gases (GHF). This was reduced by 85%. The error relates to the way that the formula for estimating reduced GHG emissions from the energy consumption output was applied.

3.24 Finally, the original GFA project end date was extended by three months until Mar 2022 in response to delays to the project start-up as a result of the outbreak of Covid-19. The procured supplier of the LED lamps shut down production at the start of the pandemic, and working restrictions were placed on WCC's installation team reducing its capacity to complete the fitting of new lamps.

3.25 The errors in the output target estimates do not appear to have had an adverse effect on the project's delivery. They were addressed early by WCC's ERDF team and did not result in any substantial change to the core activity (purchase and installation of new lamps). Instead, the change in the output target reflected the scale of conversions WCC actually proposed to deliver.

PCR 2

3.26 A second PCR was submitted and agreed by the Managing Authority in July 2021. This secured a further extension to the project's financial and practical completion dates by 6 months compared with the GFA. It also led to a reprofile of capital and revenue expenditure, and the project's outputs. Details of the updated timelines are shown in the table below.

Table 3.2 Timeline Extension PCR 2

	Original Application	PCR October 2020	PCR July 2021
Activity End Date	31/12/2021	31/03/2022	30/06/2022
Financial Completion Date	31/12/2021	31/03/2022	30/09/2022
Practical Completion Date	31/03/20	30/06/2022	30/09/2022

Source: CoWC, July 2021, Project Change Request Application and Assessment Form

3.27 The reasons for the changes were explored with the project team and were as follows:

- The Central Management System (CMS) and related nodes to remote control the lights, , both of which were essential to the functionality and effectiveness of the proposed installation of air quality and temperature sensors, could not be procured within the project's timescale. The PCR reports that bidders who submitted responses to the tender for the CMS in Q1 2021 highlighted global problems with the supply of key components of the CMS. Consultation with the SI_3 project team indicate that both bidders and they recognised that the procurement would not be completed, and the equipment obtained in time to meet project milestones.
- Without the CMS, the procurement and installation of air quality and temperature sensors could not proceed. This item had a proposed value of £0.5 million. Initially, the project opted instead to propose purchasing air quality sensors that would be controlled via the road traffic network system (linked traffic cameras and signals) recently installed in Wolverhampton. The intention was to enable the Council to redirect traffic within the city when air quality was poor. However, further investigation found that the Council already had sufficient air quality sensors operating, and this activity did not proceed.
- To respond to the project's inability to procure the CMS and the sensors, it therefore proposed to increase the number of LED lights to be installed from 18,750 to 21,500, allocating some of the CMS budget (which was £0.725 million) to this item. Additional photocell sensors were also procured by the project to operate the lights that would no longer be controlled by the CMS.
- The planned purchase of electric vehicle charging points (£50,000) was also flagged in the PCR as an activity that would not proceed. Here, the issue appears to have revolved around uncertainty about the state aid compliance of electric vehicle charging infrastructure subsidy. Although the issue was resolved, the delay occurred during a period when the Black County moved to a large-scale strategy for precuring EV charging infrastructure, and the project highlighted in the PCR that the relatively small component of funding it had earmarked would be inconsistent with this strategy. Furthermore, £16,000 of the funding would be reallocated to cycle counters and additional display boards to be delivered by the Canal and River Trust.

- A revision of profiled revenue spending was also agreed through the 2021 PCR. This revolved around the extended end date for project delivery, with revenue having been reallocated from CoWC salaries to professional fees through PCR1.

3.28 Overall expenditure did not change. There was a small, proposed change of £0.016 million between other capital and equipment with the reallocation of funds to purchase the cycle counters and display boards. Salary costs were reduced by £0.14 million, with a commensurate reduction in the indirect costs linked to the CoWC salaries. Professional fees were increased by £0.16 million, the largest increase (500%) in any expenditure category to enable the project to buy in extra capacity to install LED lamps.

3.29 Outputs were reprofiled to reflect the change in the scope of the project replacing the Central Management System with an additional 2,750 LED lanterns. This was the principal change. A detailed summary of the reprofiled outputs including both PCR 1 and 2 is shown below.

Table 3.3 Revised Outputs at PCR 2

Total	GFA	PCR 1 2020	PCR 2 2021	Change PCR 2 versus GFA
ER/C/O/32 Decrease of annual primary energy consumption of public buildings (kWh)	6,642	2,977,264	3,982,311	+3,975,669
ER /C/O/34 Estimated annual decrease of GHG (Tonnes)	5,072	747	1,000	-4,072

Source: CoWC, 2021, Project Change Request Application and Assessment Form.

3.30 The further amended outputs profile in PCR2 reflected the confirmed wattage of the newly procured LED lights and took account of actual savings evidenced from lights already installed between May 2020 and June 2021. This resulted in higher figures for reductions in energy consumption and GHG compared with PCR 1.

Summary

3.31 By any standard the SI_3 project faced several exceptional circumstances through much of the first two years of its delivery between 2020 and 2021. The most impactful change was the outbreak of the Covid-19 pandemic, which the evaluation suggests had wide-ranging consequences for the project team and the delivery of project activity throughout 2020 and well into 2021. This included challenges that stemmed from restrictions on people working 'on-site' or in CoWC's offices, evidence of global supply constraints for critical equipment, particularly the CMS, and generally significant delays in completing what should have been routine tasks, including equipment procurement, installations and project governance and management.

3.32 The response of the project to these challenges can be summarised as follows:

- Pragmatic action to reallocate funding earmarked for capital equipment that could not be secured to activities where the procurement pathway was more straightforward and not adversely affected by the Covid-19 pandemic.
- It appears that the CoWC project team made efforts to make the procurement of the CMS work before accepting that it would not be possible to proceed in time to install and implement the system.
- On the EV charging equipment, delays to the start of the project delivery phase meant that the potential to install such equipment was overtaken by a wider programme for the

Black Country. It is apparent that the non-compliance with state aid of EV charging equipment was not known at the time of the application and only became clear after the GFA was signed off.

- Reasonable adjustments were made in the project's approach to staffing the roll out of replacement LED lighting to respond to delays and shortages of staff resources by drawing in agency support.

3.33 In normal circumstances, the evaluation might point to a need for further 'soft' market testing of the planned procurement of equipment to have been carried out for the application to establish the feasibility of those purchases. However, without the pandemic, CoWC could reasonably have expected to have secured the range of equipment it required in the market, since these were not highly specialised or one-off technologies. As such, it cannot be concluded that the project should have anticipated the problems that subsequently arose.

3.34 Despite the challenges, the changes in context described in this chapter reinforced the relevance of the project in several respects. The early 2020s saw heightened attention politically in the UK and globally to climate change, with even stronger emphasis on the need to implement actions to reduce fossil fuel-based energy consumption and tackle greenhouse gas emissions. The UK Government's emerging commitment to net zero by 2050, and announcements should as the acceleration of the transition away from internal combustion engine powered vehicles to electric vehicles are indicative of a strengthening policy imperative to reduce CO2 and other emissions. A project whose strategic rationale centred on measures to reduce energy consumption and emissions therefore had heightened relevance.

3.35 In Wolverhampton, the effects of lockdown restrictions on people's movements pointed to the need to encourage active travel as a means to restore confidence in being outdoors and moving around the city, and to support economic recovery through increases in footfall. Whilst this could not have been anticipated at the time of the application, it reinforced the strategic value of measures to facilitate and promote active travel.

4. Performance of the Project

4.1 This chapter assesses the progress and performance of the project against the expenditure and output targets contracted for in the Grant Funding Agreement (GFA) signed on 15th July 2019. It draws on claims and output data supplied by the CoWC's project management team, including expenditure monitoring data and information from its output monitoring tool through to the completion of project delivery and financial completion by the end of September (Q3) 2022.

4.2 The purpose of this chapter is to identify any variations in performance against the contractual targets, the reasons for this, the actions taken to remedy any issues, and the implications for the project to achieve its objectives and targets. It also considers the project's performance against the horizontal principles.

Financial Performance

Project Expenditure

4.3 The project's Grant Funding Agreement (GFA) was for a total budget of £5.8 million, with £2.4 million ERDF matched by £3.46 million of CoWC capital and revenue. The specified ERDF intervention rate was 41.58% capital and 37.5% revenue.

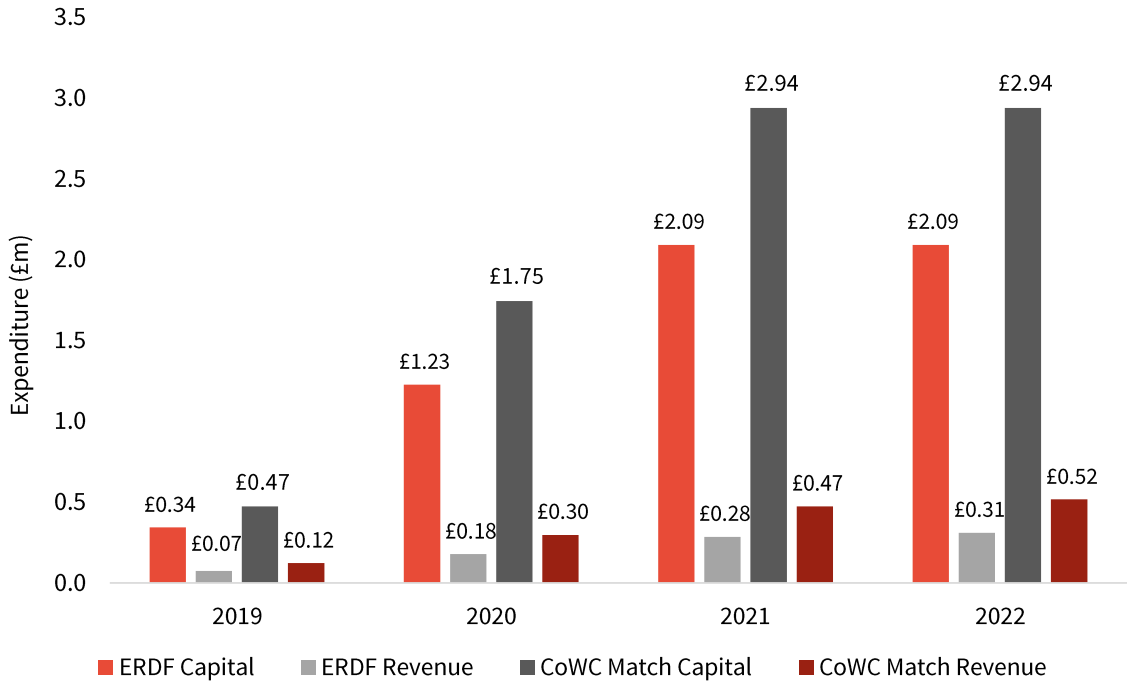
Table 4.1 Original SI_3 Funding Profile, Grant Funding Agreement

	2019	2020	2021	2022	Total
ERDF Capital	0.343	0.885	0.865	0.000	2.093
ERDF Revenue	0.074	0.104	0.106	0.026	0.310
Total ERDF	0.417	0.989	0.971	0.026	2.403
CoWC Match Capital	0.474	1.272	1.194	0.000	2.940
CoWC Match Revenue	0.123	0.174	0.177	0.043	0.517
Total CoWC	0.597	1.445	1.371	0.043	3.457
Project Total	**1.015**	**2.434**	**2.342**	**0.069**	**5.860**
Total Capital	0.817	2.156	2.059	0.000	5.033
Total Revenue	0.197	0.278	0.283	0.069	0.828

Source: Grant Funding Agreement, 15th July 2019

4.4 The original profile anticipated the majority of project capital and revenue expenditure through 2020 and 2021, with a practical activity completion date of the end of December 2021, practical completion of the project at the end of March 2022, and final grant claim submitted at the end of April 2022.

Figure 4.1 Cumulative SI_3 Project Expenditure Profile



Source: Grant Funding Agreement, 15th July 2019

4.5 The original profile of expenditure by individual capital and revenue item is shown in Table 4.2 below.

Table 4.2 Original SI_3 Expenditure Profile, Grant Funding Agreement

CAPITAL	2019	2020	2021	2022	Total
Other Capital	0.82	2.11	2.02		4.95
Equipment		0.04	0.04		0.08
Fees					
Total Capital	0.82	2.16	2.06		5.03
REVENUE					
Salaries	0.17	0.23	0.23	0.06	0.69
Flat Rate Indirect Costs	0.03	0.03	0.04	0.01	0.10
Professional Fees		0.01	0.01		0.03
Total Revenue	0.20	0.28	0.28	0.07	0.83
Project Total	1.01	2.43	2.34	0.07	5.86

Source: Grant Funding Agreement, 15th July 2019

Reprofiling Expenditure

4.6 The two PCRs resulted in changes to the project's expenditure profile in terms of the timing of expenditure and the individual expenditure items. The first PCR (October 2020) pushed back capital and revenue expenditure back a quarter with the revised profile and the original shown in the table below.

4.7 Whilst there was no overall change in the total project cost, the change in the expenditure profile also saw a shift in the balance of salaries and professional fees cost. Essentially, this reflected the delay in the start of the procurement process by CoWC, with the Council securing approval through the October 2020 PCR to vire its salary costs into the procurement of external contractors with the costs of that change reflected in the increase in professional fees. This step was taken to accelerate project delivery, with the external contractors working alongside the Council's team to complete the lamp conversions. The change also resulted in a small amount of revenue (£5,000) vired into a marketing budget.

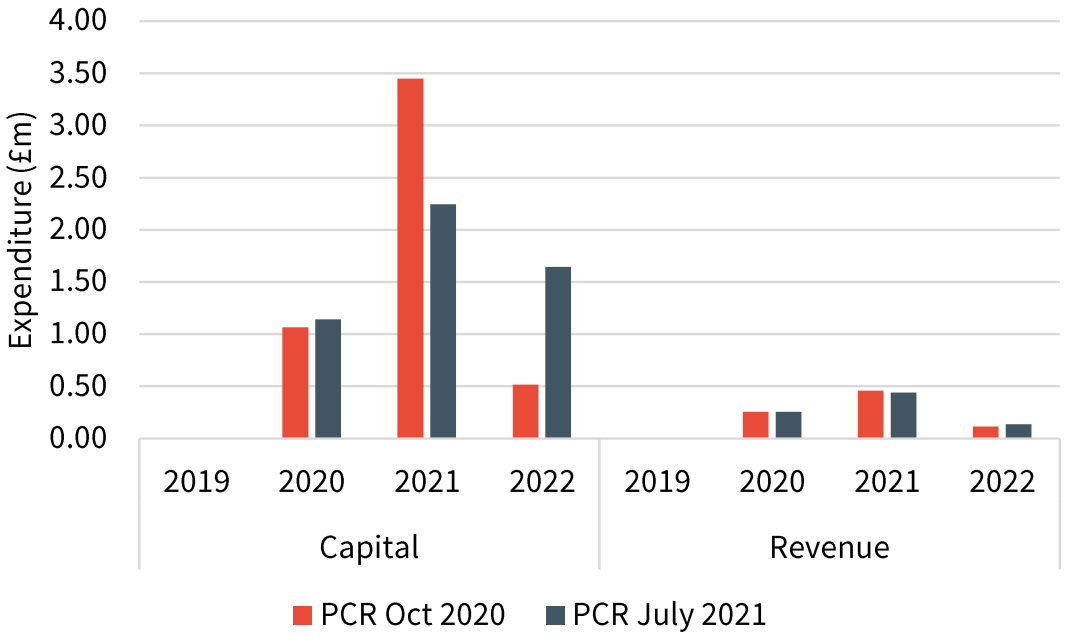
Table 4.3 Variation in Capital and Revenue Expenditure Items, GFA and PCR October 2020

	GFA (£m)	PCR Oct 2020 (£m)
Other Capital	4.95	4.95
Equipment	0.08	0.08
Fees	0.00	0.00
Total Capital	**5.03**	**5.03**
Salaries	0.69	0.546
Flat Rate Indirect Costs	0.10	0.08
Professional Fees	0.03	0.20
Marketing	0.00	0.005
Total Revenue	0.83	0.83
Total Project Cost	**5.86**	**5.86**

Source: Grant Funding Agreement, 15th July 2019; PCR October 2020

4.8 The second PCR, submitted in July 2021 and approved by the Managing Authority in February 2022, led to a further change in profiled expenditure. Whilst revenue expenditure remained in line with that of the profile revised in the October 2020 PCR, there was a significant change in the capital expenditure profile with a substantial increase in 2022 expenditure and a proportionate reduction in 2021 expenditure. The second PCR request included a change to the project's activity closure date, which was further extended to June 2022, with financial and practical completion in September 2022.

Figure 4.2 Expenditure Profile Variation, PCR October 2020 and PCR July 2021



Source: PCR October 2020; PCR July 2021

4.9 There were also further, small changes in the profile of individual expenditure items. The core capital budget was reduced slightly to reflect the abandonment of the Central Management System procurement and the decision to deliver air quality sensors linked to the existing traffic management system. A small proportion of that budget was vired to an allocation for cycle counters and display monitors (Equipment). On the revenue side, salary costs and indirect costs were slightly revised upwards to reflect actual progress to mid-2021, whilst professional fees and the marketing budget were slightly reduced.

Table 4.4 Variation in Capital and Revenue Expenditure Profile, PCR October 2020 and July 2021

	PCR Oct 2020(£m)	PCR Jul 2021 (£m)
Other Capital	4.95	4.93
Equipment	0.08	0.10
Fees	0.00	0.00
Total Capital	**5.03**	**5.03**
Salaries	0.546	0.553
Flat Rate Indirect Costs	0.081	0.083
Professional Fees	0.195	0.189
Marketing	0.005	0.002
Total Revenue	**0.83**	**0.83**
Total Project Cost	**5.86**	**5.86**

Source: PCR October 2020; PCR July 2021

Project Expenditure Against Target

4.10 Final expenditure data from the project was confirmed in November 2022. The claims data was provided by the project team and covers expenditure by the broad categories of capital and revenue expenditure described above. The final claimed expenditure is set out in Table 4.5 below.

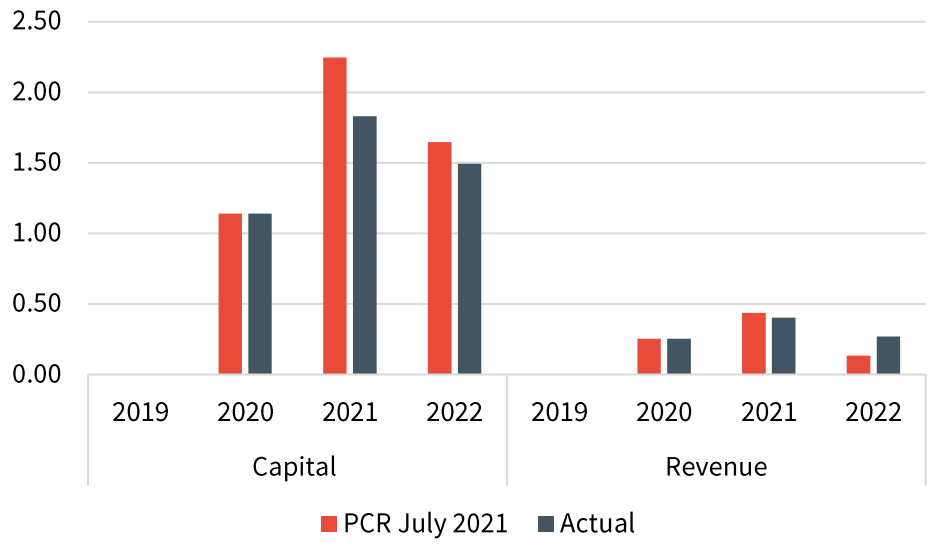
Table 4.5 Final Project Expenditure

	2020	2021	2022	Total
Capital Other	1.14	1.83	1.43	4.40
Capital Equipment	0.00	0.00	0.06	0.06
Salaries	0.21	0.22	0.19	0.63
Indirect costs	0.03	0.03	0.08	0.14
Professional Fees	0.01	0.15	0.00	0.16
Marketing	0.00	0.00	0.00	0.00
Total	**1.40**	**2.23**	**1.76**	**5.39**

Source: City of Wolverhampton Council

4.11 This translates into the following expenditure profile, compared with the revised spending profile agreed through the July 2021 PCR.

Figure 4.3 Capital and Revenue Spending Profile, PCR July 2021 v. Actual



Source: City of Wolverhampton Council

4.12 Based on this final claims data, the project was completed with an underspend of £0.47 million against the total project value of £5.86 million. This is slightly lower than a £0.6 million underspend the project team had identified was likely to arise as a result of its inability to procure the CMS and the cycle counters. However, the evaluation established that the cycle counters were subsequently secured through the CRT and its project allocation. The project secured approval from the Managing Authority in September 2022 to claim for additional light conversions which had exceeded the original 18,750 figure.

4.13 The underspend therefore represents around 8% of target expenditure. In normal circumstances, this might be considered significant. However, the reasons for it revolve around the CMS procurement. As one of the highest value individual expenditure items proposed for the project, the decision that the procurement could not proceed and the lack of an alternative technology to which funding could have been directed clearly account for the majority of the expenditure which was not defrayed during the course of the project.

4.14 If there are lessons to be learned from the project's expenditure performance, it is that the delivery of technology which is intended to be integrated into existing technological infrastructure may bring additional risks beyond those typically associated with the procurement of capital equipment. Whilst the magnitude and impact of issues with the availability of semi-conductors could not have been foreseen at the application stage, the project's experience could inform future approaches to identifying risks of this kind and their potential mitigation at the project design stage.

Output Performance

4.15 At the end of September 2022, the project's monitoring data records 19,608 individual light conversions having been completed, the quantity which underpins the project's final claim. This is short of the revised 21,500 reprofiled target and reflects the extent to which 2022 saw delivery accelerate but not to the extent that all the target conversions were carried out.

4.16 Target outputs for the project were substantially revised through the two PCRs. The project's achievements of those outputs against its targets is summarized in Table 4.6 below.

Table 4.6 Actual Outputs Achieved v. Reprofiled Targets

	PCR 2020	PCR 2021	Actual at Sep 2022
ER/C/O/32 Decrease of annual primary energy consumption of public buildings (kWh)	2,977,264	3,982,311	4,938,037
ER /C/O/34 Estimated annual decrease of GHG (Tonnes)	747	1,000	1,239

Source: City of Wolverhampton Council

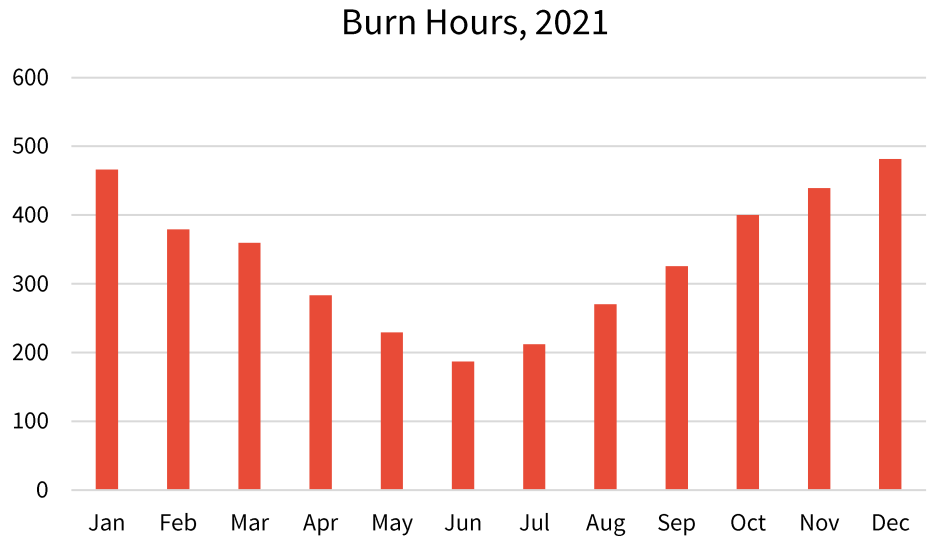
4.17 At the end of September 2022, the project's attainment against the energy saving target substantially exceeded the revised figure in the 2021 PCR by 24%. This cannot be explained by the additional LED conversions carried out above the 18,750 target, which at 19,600 exceeded the target by only 5%. It is likely to be the result of higher energy savings per conversion for some types of LED compared with the technology they were replacing, and the project's methodology for projecting energy savings (and related CO2 emission reductions) from the point at which the conversion took place. The CO2 savings target is also around 24% higher which would be expected given the relationship between the two figures where CO2 emissions are linked to energy consumed.

4.18 The methodology used by the project to estimate the outputs treats the energy saved from conversions in the month in which they took place and projects this forward. Our understanding is that the method used both to estimate kWh energy savings and CO2 emissions was approved by the Managing Authority after the project sought guidance.

4.19 Our analysis of the output reports suggests that the project's approach is likely to understate the energy saved (and therefore CO2 emissions reductions) from the conversions. The reasons for this are as follows:

- The project's reporting treats the estimated energy saved from the conversions in each month as a static figure from the point at which the lights are converted through to September 2022. In effect it treats the existing lights as continuing to burn for the same number of hours each month to September 2022, and the new LEDs also burn at the rate assumed for that month throughout the rest of the period. We have commented previously that there are minor differences between old and new light burn hours, but these are not significant.
- This means that the relevant burn hours for that month are effectively applied in each month thereafter. Since streetlights burn for fewer hours during lighter months from April-September, the assumption in the outputs reporting is that the existing and replacement lights counted during those months burn for a lower number of hours than would be the case had they been converted in a darker month.
- In practice, the burn hours of existing and converted lamps would vary month by month, being lit for much longer in the winter months than in summer. This implies that the project reports are undercounting the energy saved during winter months, and potentially vice versa. The figure below shows the pattern of burn hours for 2021, illustrating the point.

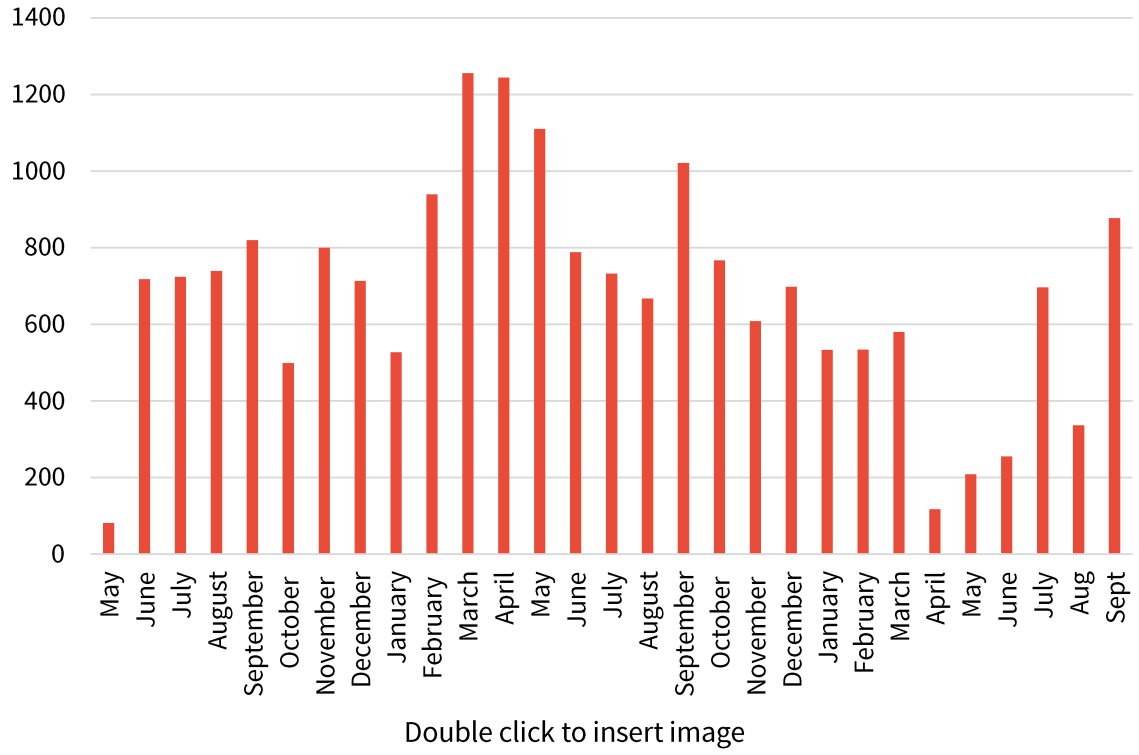
Figure 4.4 Burn Hours 2021



Source: City of Wolverhampton Council

- However, this is not a straightforward issue since the project's data also points to larger numbers of conversions during 2021 in the lighter months from March through to September. This reflects the longer daylight hours which contributed to conversion activity being extended compared with shorter days. The implication is that some of the larger numbers of conversions which took place during those months are therefore assumed in the project's reporting to burn for 'summer' hours over the reporting period, contributing to likely undercounting.

Figure 4.5 Profile of Light Conversions May 2020-September 2022



Source: City of Wolverhampton Council

4.20 If the kWh savings reported by the project understate the actual savings achieved between May 2020 and September 2022, then it is possible that the CO2 emissions reductions associated with lower energy use are also understated. However, that may be offset by use of an emissions factor for 2018 that is fixed in the outputs model. As Chapter 6 shows, emissions factors are subject to change and more recent figures published by the UK Government are slightly higher.

4.21 As such, it seems reasonable to conclude that the project is likely to have exceeded its two output targets.

Other Outputs and Results

4.22 The GFA pointed to a wider range of potential outputs and results which the project signaled an intent to capture, or at least the potential for their assessment on completion of project delivery. These included:

- **Increases in cycling:** Whilst the cycle counters were installed, data provided to the evaluation does not point to any discernible increase in cycling use by the time the project was completed. This is likely to reflect the impacts of the Covid-19 pandemic which imposed significant restrictions on the movement of people over extended periods. Since the solar lighting on the canal network was completed in 2021, and the development of the app to encourage use of the canal network has only recently been completed, there is not yet any evidence with which to measure change.
- **Air pollution and CO2 emission reductions:** Linked to changes in active travel use, the GFA pointed to the potential to capture improvements in air quality and additional CO2 emission reductions which might be generated by the project. On air quality, the GFA

referred to four roads in which air quality thresholds were exceeded in 2017 as a baseline. However, no data was reported by the project itself on air quality. Any changes that occurred during 2020 and 2021 are likely to have been significantly affected by Covid-19 movement restrictions, and it is apparent that post-Covid working patterns, an important driver of vehicle and cycling/walking movements in the city have not yet returned to pre-Covid levels. Furthermore, much of the infrastructure was delivered through 2021 and 2022, meaning that it is too early to reliably capture any changes which might be attributable to the project. On the additional CO2 emissions reductions, the GFA pointed to this effect being linked to additional cycling km, but no data was captured which might be used to estimate this.

4.23 For both of the potential additional outputs and results identified above, a combination of the impacts of the pandemic, the timing of infrastructure delivery, and decisions not to proceed with the CMS, air quality and other sensors meant that robust data could either not be collected and reported, or that changes are unlikely to have occurred as a result of the project's effects by September 2022. This is an issue which is addressed further in the evaluation's conclusions and recommendations.

Summary

4.24 Analysis of the performance of the project against its expenditure and output targets paints a mixed picture.

4.25 On expenditure, the project's final claims data point to an underspend of around £0.47 million in total. This is lower than an estimate produced by the project in 2021, which suggested that underspending could be £0.6 million following the cancellation of the procurement of the CMS, the decision that EV charging infrastructure was ineligible and the expectation that the cycle counters would be funded outside the project.

4.26 On the outputs targets (C32 and C34), the project's own reporting indicates that it exceeded its reprofiled targets specified in the July 2021 PCR. The data shows that the C32 energy saving target was exceeded by 24%, whilst the CO2 emissions reduction target was exceeded by the same figure.

4.27 Further analysis of the project's methodology for reporting its outputs suggests that it is likely to understate the energy savings and therefore the CO2 emissions reductions. This is the result of assumptions for modelling energy consumed from the point of conversions that does not appear to follow the annual profile of burn hours which vary over the course of a year.

4.28 The combination of output figures which were substantially revised from the GFA through the two PCRs, and the potential for undercounting on the basis of CoWC's own reporting methodology, are lessons for the project team to consider for future interventions of this kind. It perhaps reflects the extent to which the CoWC had less experience of ESIF projects delivering outputs of this type than the range of enterprise support, skills and other infrastructure investment which has featured in the current and previous programmes. Further clarity about the required methodology and the issues to consider in designing it into the project should be considered at the application stage.

5. Project Delivery and Management

5.1 This chapter provides a comprehensive assessment of the delivery of the SI_3 project. In line with the ERDF Summative Assessment guidance, the chapter assesses governance and management arrangements for the SI_3 project, including systems and processes for project delivery, monitoring and reporting. It reviews the strengths and weaknesses of these arrangements and considers how they contributed to the project's meeting its objectives and targets. It examines individual components of the project delivery process, exploring the factors that shaped how effectively and efficiently the project was able to achieve its objectives, financial and output targets, and the lessons that might be learned from the process.

5.2 The chapter has been informed by:

- Review of the project's application, GFA and a full suite of meeting reports provided by the CoWC's project management team;
- Consultations with the CoWC and Canal & River Trust team.

5.3 It should be noted again here that the personnel changes that occurred from the initial delivery stage of the project post-GFA through to its completion in September 2022 resulted in discontinuities that meant that no single individual was involved in project delivery from start to finish. As such there are some gaps on some detailed aspects of the project delivery process, although they are not material to the overarching conclusions and recommendations to be drawn from the assessment.

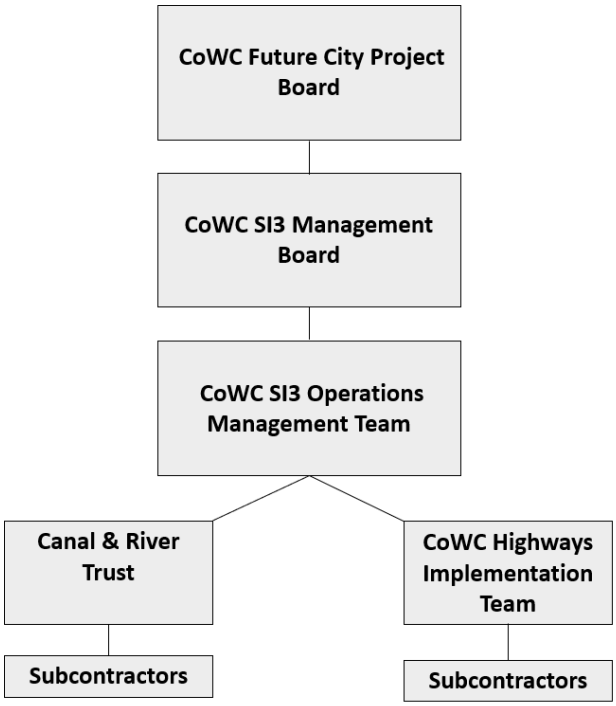
Governance and Strategic Oversight

Adaptable project governance arrangements

5.4 The application form and GFA specify that the SI_3 project would be led by the City Environment Team in the Place Directorate at CoWC. It described the intent to establish a Management Board of key officers, including an ERDF Project Manager, to run the project. This would report upwards to the CoWC's Future City Project Board, essentially the key strategic body in the governance arrangements. Delivery of the project's key activities would be led by the Highways Implementation Team and the Canal and River Trust to which responsibility for the canal-based infrastructure was delegated.

5.5 An organogram of governance and reporting lines set out in the original bid and GFA is shown in the diagram below.

Figure 5.1 Proposed Governance Arrangements

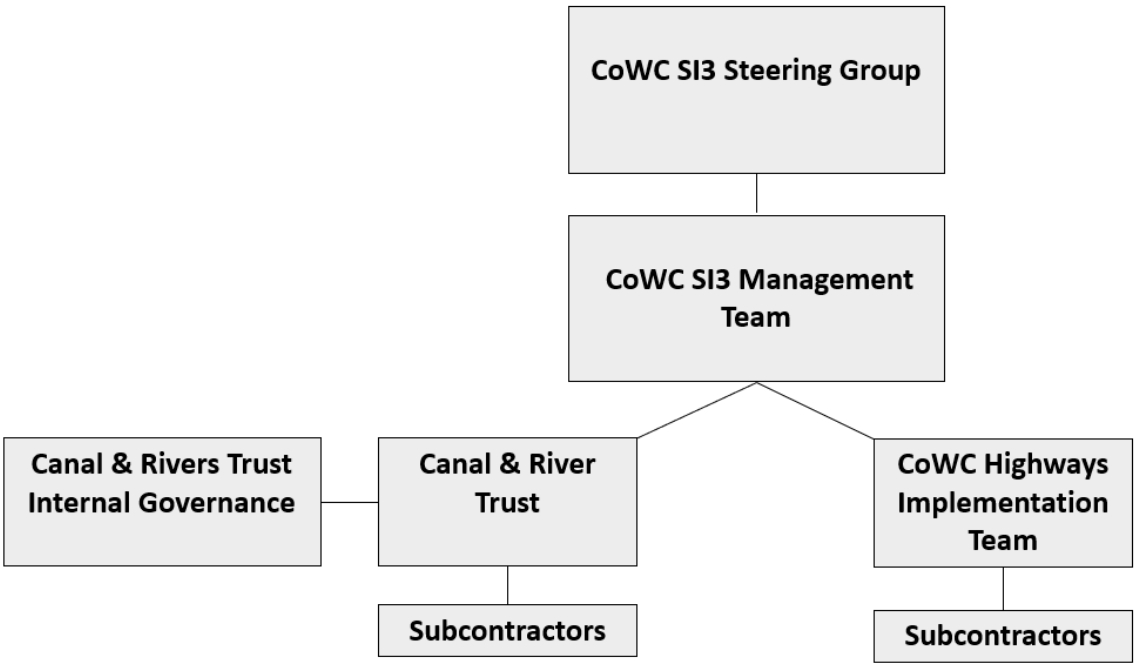


Source: Hatch, 2022

5.6 By the time the project entered its delivery phase the Future City Project Board had been disbanded. No successor or alternative was put in place by CoWC. Instead, project governance subsequently revolved around the SI_3 Steering Group. This body met bi-monthly throughout the project's lifetime, and effectively operated as its main decision-making body, holding the project to account during its delivery. The Steering Group comprised Wolverhampton Highways Team Lead, Wolverhampton Road Safety Manager, the Canal and River Trust Team Lead, the SI_3 Project Sponsor and its Project Manager. In this regard, it brought together a group of senior and experienced officers, several of whom were integrally involved in the project itself, and who occupied senior and functional roles in the key partners involved in project delivery.

5.7 The governance arrangements which applied through project delivery are show in Figure 5.2 below.

Figure 5.2 Actual Project Governance Arrangements



Source; Hatch 2022

5.8 The Steering Group's functions were to receive regular reports on progress from the Project Manager, to monitor procurement and delivery activity, to consider risks and mitigating actions, and to maintain oversight of the delivery activity of the Canal and River Trust.

5.9 In summary, CoWC recognized at an early stage that project governance would need to be adapted to changes in strategic governance arrangements within the organization. Since the Council and the senior team involved in the project had many years' experience of managing and delivering capital projects, the decision to use the SI_3 Steering Group as the focal point for project governance did not reduce the effectiveness of project governance compared with the originally proposed arrangements. If anything, it may have streamlined the arrangements.

Strategic oversight was effective

5.10 The governance arrangements helped ensure that the SI_3 project was implemented in line with ERDF requirements, and that it was well-embedded into the wider strategy and programme for digital infrastructure roll-out in Wolverhampton, and for its place-making priorities. The project team was experienced in governance for projects of this type, and the combination of the project being integrated into the wider programme and the team's seniority and experience appears to have resulted in effective strategic oversight of activity.

5.11 A particular strength appears to have been both the composition of the Steering Group meetings and their frequency which were held every other month throughout the project delivery period. Consultations with the CRT pointed to the frequency of these governance meetings being higher than many other ERDF projects they had been involved in delivering. In the CRT's view, this helped ensure that SI^3 project expenditure and delivery targets were monitored effectively, and that challenges with procurement and delivery timetabling (which were clearly atypically difficult issues during the Covid-19 pandemic) were transparent and a focus for discussion and resolution.

5.12 This points again to the broader challenge which affected the project from the outset in that the combination of changes of key personnel, the pressures faced by UK local authorities in terms of resources and the onset of the Covid-19 pandemic resulted in a lack of continuity at times. The role of the Steering Group has in practice limited the risk to the project from this discontinuity, together with the ability of CoWC and the CRT to draw on a range of personnel experienced in both ERDF and the type of infrastructure the project has delivered.

Canal and River Trust integrated into project governance

5.13 It is evident from the evaluation research that the CRT was integrally involved in the project's overarching governance and management arrangements. The CRT's lead officer reported into the ERDF Project Manager and the SI_3 Steering Group. The lead attended Steering Group meetings to give updates on the delivery of the solar powered canal lights and the development of the digital wayfinding app, the latter the outcome of the changes agreed through the PCRs.

5.14 The CRT also drew on its own internal governance mechanisms for oversight of its components of the project, with the project lead reporting into the Senior Management Team who provide authority and oversight of procurement and budget decisions. Since it focused on the delivery of infrastructure with which the CRT was already familiar and experienced, this appears to be a have been a straightforward process in which the organisation the SI_3 project was considered to be a relatively non-complex project by the CRT and therefore only required authority from senior management at certain key stages.

5.15 The involvement of the CRT in the Steering Group ensured that CoWC's main delivery partner was therefore embedded in project governance. Consultations with the CRT suggest that this worked well, with the organisation clear about what was expected of it and in turn that it was able to contribute regularly to the strategic review of project activity.

Project Management

Roles and responsibilities were clearly defined

5.16 From the outset, the core project management responsibility resided in the City Environment team at CoWC, with the two key roles being the Project Sponsor and Project Manager. The two roles were also present on the Steering Group, reinforcing the extent to which the project's governance was well-aligned with its management arrangements.

5.17 The key individual roles, responsibilities and reporting lines are set out below:

5.18 **Senior Responsible Officer** (SRO)– The Service Director for the City Environment acted as the Senior Responsible Officer for the majority of the SI_3 until departing the Council in 2022. As service director for City Environment, the SRO was responsible for the programme of digital infrastructure roll-out and environmental improvement projects across the city of Wolverhampton. This ensured the SRO had a strong understanding of the project's objectives and activities, and how they were integrated into the wider digital infrastructure programme. At the present time the Director for the City Environment remains vacant and there was no SRO in post for the final six months of the project. However, there is nothing to suggest that this adversely affected the final stages of the project as it moved towards closure, since much of the activity including the procurements had been completed by the time of the SRO's departure.

5.19 **Project Sponsor** – the Head of External Funding and Digital Projects acted as Project Sponsor throughout the project, reporting into the SRO. The project sponsor had over 16 years'

experience delivering infrastructure projects, including ERDF projects, within the public sector and was responsible for delivery all of the projects outlined in the Digital Wolverhampton Strategy. The Project Sponsor provided regular project updates to the Steering Group, supported by the ERDF Project Manager. During periods when no ERDF Project Manager was in post, the Project Sponsor picked up day-to-day project delivery duties including acting as the key contact for the CRT, completing the monthly reports and monitoring project expenditure. When no ERDF Project Manager was in post, the Project Sponsor was supported by the wider ERDF team at the CoWC who themselves have many years of experience delivering the ERDF funded projects and are aware of all necessary compliance requirements. There is no evidence to suggest that a lack of continuity in personnel therefore had a negative effect on either governance or management arrangements.

5.20 **ERDF Project Manager** – ERDF Project Manager was responsible for adherence to the ERDF contract delivery requirements and the production of ERDF claims in accordance with the formal reporting requirements. The Project Manager was also responsible for monitoring spend and outputs against the target profile, with any variations escalated to the Project Sponsor.

5.21 This emerges as probably the most challenging aspect of management arrangements for the project. The project had two different ERDF Project Managers in post during its delivery period, and there were extended periods when the post was vacant and could not be filled. The first Project Manager was in post for c. 18 months, and that appointment took six months to January 2020 to secure. The delay was attributed in part to delays in securing the GFA and in part to challenges identifying an individual with the right skills and experience on ERDF projects.

5.22 Consultations for the evaluation suggest that the first Project Manager did an effective job in setting up all of the project's monitoring and reporting systems, identifying and revising the outputs framework, and driving forward the difficult procurement process. However, that individual left the role in July 2021, well before the completion of project activities.

5.23 From mid-2021 it took several months to procure a replacement Project Manager, with consultations suggesting that identifying an individual with appropriate skills and experience. It is not clear (and is outside the scope of the evaluation) to determine how far this reflects a deeper issue in the availability of experienced ERDF project managers in England currently. It is possible that the UK's decision to leave the European Union which may have resulted in such roles becoming perceived as less attractive as careers, and continuing challenges being experienced by local authorities in terms of financial resources and costs, played a part in these recruitment issues.

5.24 The second Project Manager was appointed in January 2022 but left after four months in April 2022. There is nothing to suggest that this could have been foreseen by the CoWC team. At the point of this second departure, the Project Sponsor chose not to recruit a third Project Manager as there were only five months left to completion of the project and the process is likely to have been time and resource intensive.

5.25 Overall, the evaluation found that the requirements for project monitoring and reporting continued despite the changes in personnel. This is because the Project Sponsor who took over the role of Project Manager when the post was vacant had a wealth of experience delivering digital and environment infrastructure projects, as well as ERDF experience. The Project Sponsor was supported by a number of colleagues in the department who had experience delivering ERDF compliant projects and could assist with the reporting requirements.

5.26 **Installation Team Project Manager** – The Council's Highways Operations Manager oversaw the installation of the LED lights for the majority of the project, assuming responsibility at an early

stage of its implementation. The Highways Operation Manager had over 31 years of experience managing a range of services including street lighting and highways maintenance, and took charge of designing the electronic circuits in the LED lighting system, ran the various procurement exercises, managed the highways engineers and carried out day-to-day project activities. He reported to the Project Sponsor and Project Manager and oversaw two subcontractor companies brought in to support project implementation in response to delays and resource constraints which arose during the Covid-19 pandemic.

5.27 The Highways Operation Manager left the role in the summer of 2022, three months before the project ended. At this point the team's junior operations manager stepped into the role. This change in personnel does not appear to have adversely affected the delivery of the core components of the project since they were already near completion. Consultations suggest that the service provided by the Installation Team was efficient throughout the majority of the project delivery period, despite the impacts of the pandemic. This seems to be attributable in part to the experience of the individual in the role and a smooth transition to another experienced individual when responsibility was passed on in mid-2022.

5.28 **Canal and River Trust Project Lead** – The CRT's Enterprise Manager (Black Country and Staffordshire) acted as the organisation's project lead, overseeing the implementation of the solar powered towpath lights, the development of the digital wayfinding app and the procurement and installation of the canal path movement counters.

5.29 As was the case with the CoWC personnel, the CRT's lead had a large amount of experience working on ERDF projects. The Enterprise Manager had two CRT officers reporting to them, a Project Manager for installing the Solar LED lights and a Project Manager for developing the wayfinding app. Each Project Manager was responsible for guiding the work of the CRT's sub-contractors for these individual activities.

5.30 Consultations suggest that the team's expertise and experience enabled it to tailor the infrastructure and its installation to the specific characteristics of the canal network and environmental priorities. For example, solar panelled lighting was designed and installed so that it would not impact wildlife. The CRT managed its allocation of the budget so that it was able to extend the roll out of solar lights to the Broad Street Tunnel, using a solar panel to power the lights which was highlighted by CoWC as one of the first examples of its kind for a tunnel on the canal network. In taking this step the CRT ensure that a complete 12km of canal towpath was adequately lit.

Effective partnership working

5.31 Given the positive messages about the integration of the CRT into project governance and management arrangements, it is clear that the project's approach to partnership working was largely effective. The CRT was effectively sub-contracted to the project, with the GFA setting out the procurement paths, project plan and governance framework for its components of the work. The GFA, and CoWC's approach to working with the CRT, gave the latter full autonomy to undertake procurement and make decisions on the project without prior sign off from CoWC. Consultations indicate that this worked well, attributable to the experience of the CRT in delivering interventions of this type, and to the involvement of the CRT's lead in project governance and management. Both the CRT and the CoWC reported in consultations a positive working relationship, pointing in particular to the frequency of engagement in Steering Group meetings having helped create a good working relationship.

5.32 If there is a lesson to be learned, it is that the CRT was not fully involved in the development of the project application. The CRT observed that its input into the design of the detailed activities proposed for the project, and the organisation's anticipated role in delivering them, could have been more substantial as the application was being drafted. Assent from the CRT for its involvement as a partner was secured from the project's bid writing team at CoWC, but it would have benefited from more focused input into the specification of activities. For example, it was acknowledged that the digital wayfinding activity had been defined in only a basic form for the application, meaning that substantive development of the initiative was required once project delivery commenced. This perhaps created a risk that the activity might not be well-aligned to the project's objectives, or even feasible.

5.33 It was not possible for the evaluation to establish the detail about how the Council engaged with the CRT at the project design stage, since the key personnel in both organisations had left and were not available for consultations. The CRT had to invest time in the initial stages of its work running forums with partners including CoWC and Active Black Country to determine how 'digital wayfinding' might be defined and operationalised. Whilst the CRT was able to work with the Council and other partners to develop the app initiative (providing digital videos of the canal path routes), which positively reflects on the approach to partnership working, the lesson is perhaps that such activities should have been more explicitly tested through the application process, and specified through the GFA.

Project Systems and Processes

Tried and tested systems worked effectively

5.34 The overriding message about project systems and processes is that there were effective and appear to have met the key ERDF requirements. The Council and the CRT clearly benefited from both prior experience of managing and delivering ERDF projects, and from the wider infrastructure of project management systems and processes operating within the two organisations.

5.35 The CoWC used a management information system that had been tried and tested in several previous ERDF projects delivered by the Council. This used cloud-based Verto software that follows the PRINCE 2 management methodology. The MIS enabled the production of a monthly highlight report covering progress against milestones, cost status, issue status, financial benefit status and non-financial benefits status. The ERDF Project Manager completed the Verto reports each month, and the evaluation was provided with project information that was consistently formatted and comprehensive. When a Project Manager was not in post the Project Sponsor took on this role with support from colleagues experienced in delivering ERDF projects. The management team reported that the Verto software was easy to navigate and ensured that the delivery progress of each project component was tracked.

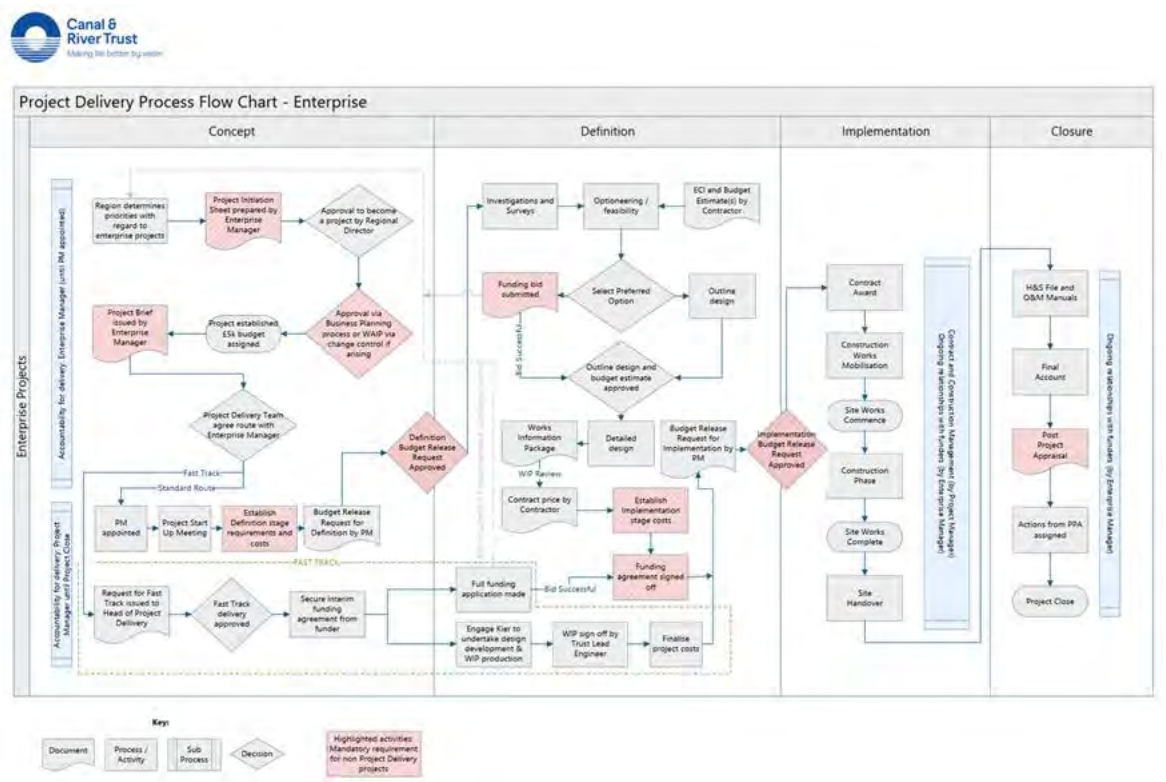
Canal & River Trust used established systems and processes

5.36 The CRT used its own internal project delivery processes to implement the project. These processes cover the contract award, mobilisation of work, construction phases and site handover (if relevant). Decision gateways are set out at key points in the project before work commences. This ensures that there is adequate time allowed to prepare for key decisions.

5.37 Consultations with the Council and CRT lead suggests that the robustness of the latter's project management systems and processes gave the Council the confidence to entrust delivery to the

CRT without the need for day-to-day oversight, and to the implementation of the CRT's activities having remained on track despite the challenges presented by the Covid-19 pandemic and the additional development work that was required to define the digital wayfinding component. The diagram below outlines the processes CRT use when delivering infrastructure projects, and underlines the extent to which the organization used a well-established set of procedures to guide the delivery of its contribution to the SI_3 project.

Figure 5.3 CRT Project Delivery Process



Source: Canal & River Trust, 2022

Procurement processes were sound but significantly affected by Covid-19 pandemic

5.38 A recurring message in the evaluation is the extent to which planned activities were significantly and negatively affected by the extraordinary circumstances of the Covid-19 pandemic. The evaluation found that the CoWC and CRT were able to negotiate the challenges of running procurement processes when lockdown restrictions had created uncertainty for suppliers and when staff resources to complete the procurements were also constrained by the impacts of the pandemic.

5.39 The procurement of the LED lights by CoWC, and of the additional lighting engineers support commissioned via an agency, was carried out by the Council's Highways Installation team lead following the Council's Contract of Standing Orders, and using what were reported to the evaluation as ERDF compliant procedures. Consultations suggest that the Council benefited from having a good understanding of ERDF project procurement rules and a team of officers experienced in capital equipment procurement. The LED lights contract was a direct award contract reflecting the relatively narrow field of potential suppliers available, a situation exacerbated by the pandemic.

5.40 Updates on the progress of the key procurement process were taken to the bi-monthly Steering Group, with the Council's procedure giving delegated authority from the Cabinet Member for City Environment to the project to award contracts of this type with a substantial value. This appears to have helped to reduce the risk of further delays when circumstances were already difficult. The Highways Installation Team Lead attended the SI_3 Steering Group meetings to give updates on the progress of the procurement and any concerns or issues including those associated with delays to the procurements were discussed at these meetings and solutions were sought.

5.41 Of those key activities for which equipment could not be procured, particularly the CMS, it is not possible to conclude that there were any significant shortcomings in the project's procurement approach, since it was subject to exceptional circumstances which could not have been foreseen when the project was designed. The evaluation found that the CoWC project team had attempted to mitigate the impact of failure to carry out the CMS procurement by considering the procurement of additional sensors that could be linked up to a pre-existing CMS used by the Council's Waste Management team. This suggests that the project responded flexibly to its changing delivery context, but it is clear that the time available worked against the project, and that potential to connect sensors to an existing CMS deployed by CoWC was quickly established to be not feasible.

5.42 Review of the project's application and the specific related risks to procurement it highlighted as part of its assessment of dependencies and risks suggests that the potential for delays to affect procurement, and the impacts of this, were clearly recognised. In particular, the application pointed to the dependency of the implementation of SMART technologies on the infrastructure being in place in good time to enable connectivity to networks. To address this, the project identified the procurement of its infrastructure investment as a foundational task in its pre-start up (months 0-3) stage, the achievement of which would provide the nodes and sensors for connection to the CMS.

5.43 Clearly, it was impossible for the project to anticipate that there would be global supply issues relating to the CMS procurement. Whilst the procurement of the LED light supplies was successful, this was also subject to pandemic-related delays. Whether or not the project could (or should) have identified a 'Plan B' as part of its risk assessment at the application stage, or whether CoWC should have soft-market tested the availability of such equipment as part of that process, are issues the CoWC project team could consider in its response to the evaluation. However, the causes of the problems that led to the CMS procurement being terminated were exceptional. It is therefore difficult to reasonably conclude that plans to deliver an initiative of this type should identify in detail contingencies and alternatives where it relates to procurements that would, in most circumstances, be relatively routine.

5.44 There is perhaps also a message here about the level of risk involved in the procurement and use of relatively new technologies and the innovation involved in the application of SMART technologies. The evaluation does not suggest that the project's design included commitments to procuring equipment whose availability would be uncertain. However, where the implementation of innovative technology is dependent on other equipment being in place (as the project application form suggested), there are arguably stronger dependencies and therefore risks than would the case if a single and simple form of equipment were being procured.

5.45 The CRT used its own procurement processes and sign off procedures to award the contracts for the development of the digital wayfinding app, purchase and installation of the solar lights and the movement counters. Procurement for the SI_3 project was signed off by the designated Senior

Officer at the CRT, and consultations with the CRT suggest that this was straightforward despite some challenges resulting from pandemic restrictions.

5.46 The Council's approach to working with the CRT was flagged in the application as an intentional choice in working with a trusted partner and limiting the complexity of any sub-contracting by operating with just one partner. This appears to have contributed to the effectiveness of the CRT's procurement process in that its delegated authority from CoWC enabled the procurement and subsequent delivery to be time efficient.

Monitoring and reporting for core outputs were consistent and comprehensive

5.47 A complete and consistent suite of financial and output monitoring and reporting data was provided to the evaluators. The project clearly benefited from the experience of the first ERDF project manager who set up monitoring systems and a reporting schedule that was maintained throughout the project delivery period. The SI_3 Project was monitored against its financial spend targets and the following outputs:

- C32 Decrease of annual primary energy consumption of public buildings;
- C34 Estimated decrease in Green House Gases.

5.48 Once initial errors from the GFA were identified and corrected, the limited number of outputs meant that output data collection and review were relatively straightforward, and the output data collection tool was structured so that it enabled the project to capture energy savings and associated effects on GHG emissions for each of the individual conversions of lighting.

5.49 Oversight of project spending and outputs was provided by the Steering Group. This ensured that review of progress involved both senior personnel involved in project delivery and strategic officers with overarching responsibilities for the Smart City programme, highways and the Council's environment directorate functions.

5.50 Both the CRT and the CoWC Highways Installation Team were required to attend the Steering Group to update on the progress for outputs and financial spend. The CRT delivered components of the project were not included in direct ERDF outputs, and the organisation's inputs into reviews therefore mainly consisted of project progress and financial spend updates. At the meetings the CoWC's Highway's Installation project lead would update on the financial spend, and they also provided the raw data on previous energy consumption vs current energy consumption for the outputs reporting framework.

5.51 The Project Manager (or when required the Project Sponsor) used the information provided at the Steering Group to complete the Verto Project Management Report and ERDF quarterly monitoring forms. When there was no Project Manager in post the Project Sponsor was supported by colleagues who had experience delivering ERDF projects.

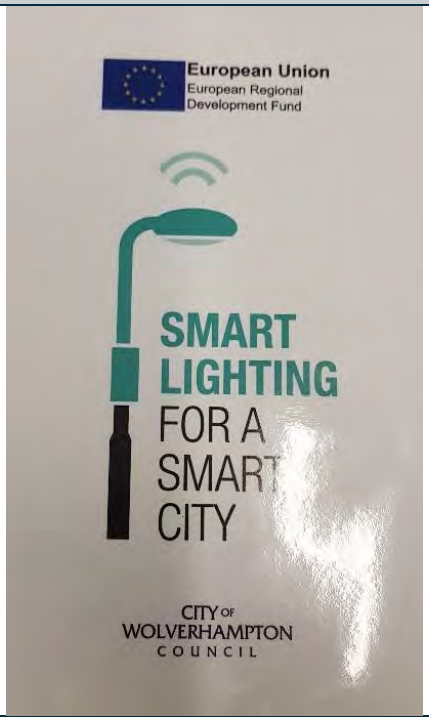
5.52 The evaluation was provided with a comprehensive record of reports issued to the Steering Group. These used the Verto software and give a detailed record of the status of project delivery, issues arising from the delivery process, the status of individual activities and milestones, project expenditure and outputs. Hatch has reviewed all of these monthly reports and they give a clear picture of how the project's performance was reviewed, and transparency about how issues were identified and action taken, including the measures taken through the PCRs and decisions about vired expenditure on specific activities as the project responded to the procurement and delivery problems that arose during project delivery.

Marketing and publicity appear to have met ERDF requirements

5.53 The CoWC and wider CRT have a strong track record delivering ERDF projects and are therefore experienced in developing compliant marketing materials.

5.54 The project used individual publicity stickers (see Figure) on some of the converted lampposts to identify that the upgrade was paid for by ERDF.

Figure 5.4 Sample of Publicity



5.55 Once all the solar lights had been installed by the CRT, permanent signs were added along the canal towpath and in the Broad Street Tunnel advertising the SI_3 project and indicating that it was funded by the ERDF and CoWC.

5.56 On communication about the project, a press release advertising the part ERDF funded SI3 project was released in March 2021 on the CoWC website and in the local press (Express & Star and Birmingham Live). The article focused on the 12km of solar lighting implemented along the canal towpaths. The evaluation team has reviewed examples of further press releases and information about the project delivered by CoWC on its website and through its range of publicity channels.

5.57 The wayfinding app, developed by the CRT, was due to go live at the end of September. It is understood that a number of press releases will be added to the CoWC and CRT websites and through social media channels to advertise the new app.

Delivery of cross-cutting themes was embedded in core project activities and targets

5.58 Delivery of requirements on cross-cutting themes (Sustainable Development and Equal Opportunities and Non-discrimination), particularly sustainable development, were integral to the SI_3 project and were identified as such in the application.

5.59 Commitments to sustainable development, which were a core part of the rationale and objectives for the project, were backed by the CoWC's Sustainability Strategy, meeting the ERDF's guidance that projects should be underpinned by sustainable development policies. Much of the project's activities directly addresses the priorities of the policy:

- Increased renewable and low carbon energy generation: Met through the delivery of the extensive network of solar lighting on the canal network by the CRT.
- Reducing energy consumption through energy efficiency measures: Met through the delivery of low energy LED lighting, the project's main activity, with the conversion of less efficient sodium and older LED lighting.

- Encouraging sustainable and active travel: Whilst it is too soon to assess how effectively the project has boosted walking and cycling, the installation of solar lighting on the canal network and the provision of wayfinding information for users has laid the foundations to achieve this.
- Improving air quality through ultra-low emissions vehicle programme: Whilst increases in active travel may have some positive reducing impact on vehicle use in central Wolverhampton, there is not yet sufficient data to establish whether this objective is being achieved. The project was not able to install centrally managed air quality sensors.
- Improved quality and quantity of open space: The CRT's delivery of solar lighting and the way finding app positively contributes to this sustainability priority.

5.60 The project's contribution to the Sustainability CCT should also be seen in the context of the CoWC's commitment to carbon neutrality as an organization by 2028 and its declaration in 2019 of a climate emergency. The project is part of a wider suite of smart technology interventions, and the installation of the lights includes integrated sockets that will enable in future sensors to be connected to them to control energy use and monitor environmental factors. In this regard, the project is helping to futureproof the city both for the further roll out of smart technology and infrastructure that will support the Council's net zero ambitions.

5.61 Implementation of the Equality cross-cutting theme is less direct but is nonetheless evidence in the core activities delivered by the project. This includes:

- Implementation of smart technology infrastructure that forms part of Wolverhampton's wider strategy to extend access to high-speed broadband and Wi-Fi connections that should be open to all the city's residents. The challenge for CoWC will be to deliver this at a cost that is affordable to residents on lower incomes for whom charges are an issue. This is outside the scope of the project itself, but is an issue that the Council and its partners will need to continue to consider.
- Wolverhampton's digital strategy seeks in part to 'democratise' access to services, better enabling residents who may struggle to find information about services to obtain it. The project application also highlights the potential benefit of extending the ability of residents to work from home and to access service information and support from home via digital technology, with health and other benefits to residents who may face barriers because of physical or mental health conditions. The Wolves Online initiative is a good example of this activity in practice, with 1,000 residents supported to access devises and connections working with partner organisations to ensure that communities including partially sighted people, deaf people, refugees and migrants are reached.
- Future installation of smart sensors, using infrastructure delivered by the project, should assist the Council and the organisations it works with to collect and use data in ways which will benefit all of the city's resident communities.
- Activities which encourage walking and cycling, particularly the roll out of the solar lighting network, should encourage the use of low or zero cost travel options for residents of the city to travel to work, leisure, services and to exercise. With living costs rising steeply during 2022, increase use of the canal network has the potential both to be 'open to all' and to assist in providing low-cost travel options.

5.62 The impacts the project will achieve through the delivery of the cross-cutting themes are a work in progress. The extent to which they will be realized and the magnitude of their impact will only become clearer as roll out and use of smart city technology increases, and uptake of active travel

options becomes established. The Council and CRT should continue to monitor progress in this area.

Project Delivery

5.63 Given the challenges faced by the project, the final section of this chapter assesses how far the activities ultimately delivered by the project met the specification set out in the GFA, and the factors that influenced the delivery of each of the key activities.

5.64 The table below summarises the key activities identified in the GFA or PCRs and what the project achieved at the end of September 2022 (completion).

Table 5.1 Key Activities Proposed and Achieved

Activity identified in GFA and PCRs	Achieved
Conversion of streetlights to energy efficient LEDs	19,608 LED lights converted, including photocells to control lights
Central Management System	Not delivered
Additional air quality and temperature sensors connected to traffic management system	Not delivered
Solar powered lights on canal towpaths	12km of solar powered lights delivered, representing one light per 10 metres
Digital wayfinding app	Completed September 2022
Seven cycle counters	Three cycle counters delivered by CRT

5.65 **LED Light Conversions**: The original project target was 18,750 LED conversions. At the July 2021 PCR this target was increased by 2,750, taking the total target to 21,500. At September 2022, project monitoring data shows that 19,600 had been installed, implying that the project was c. 1,900 conversions short of its revised target, and that it had not entirely caught up to its target after the initial delays resulting from the pandemic. The initial implementation of the LED lights had been delayed until May 2020 as the supplier factory were forced to halt manufacturing during the first lockdown. The Installation Team was able to make up for some of the time lost by procuring Hi-Lite (an electrical engineer agency) to implement a proportion of the LED lights. The capacity of the team was reduced again in 2022 when it lost two members of staff within three months, one of which was the Team Lead. Our understanding is that the team was still an engineer short following a new appointment, and that implementation slowed towards the end of the project.

5.66 **Central Management System**: The reasons for the failure to procure the CMS are described earlier in the evaluation report. Additional sockets have been added to the lampposts so that they can be linked to a central management system when the worldwide microchip shortage has subsided, and in this regard the project has ensured that the installed infrastructure is future-proofed so that smart technology can be delivered as the city's programme continues.

5.67 **Additional sensors attached to CMS**: The additional sensors could not be procured as the sensors would not function without the CMS. Other options for this technology were explored but could not be delivered.

5.68 **Solar Powered Canal Lights**: The CRT implemented 12 km of solar powered lights (one every two meters). The project was even extended so that the 85 ft Broadstreet tunnel under the Wolverhampton Station car park would be lit. This part of the project was well managed by CRT

with no direct management from CoWC. The CRT had full delegated authority for their part of the project and regularly reported updates to CoWC through the SI3 Steering Group Governance Board. ERDF compliant procurement processes were followed i.e. OJEU or direct award. Decisions were made quickly and arising issues were easily mitigated.

5.69 **Cycle Counters**: The CRT delivered three cycle counters with the ERDF funding in December 2021. These were combined with three cycle-counters delivered in 2020 with CRT's own funding giving a total of six compared with seven identified in the GFA. The cycle counters were delivered roughly a year later than planned. The data provided by the counters was heavily impacted by local lockdowns following the outbreak of the Omicron variant of Covid-19 during 2021. As a result, the limited data provided by the CRT and CoWC is not reflective of use of the canal network during the winter months from October - January when the solar powered lights would likely be most impactful in encouraging cyclists and walkers to use it. There is some lack of clarity about how many cycle counters were expected to be delivered and whether the vireing of project expenditure through the PCRs committed the project to deliver additional cycle counters.

5.70 **Digital wayfinding**: During the preparation of this evaluation report the app had not yet gone 'live' but was due to be launched by the end of September 2022. Feedback from CRT suggests there was an initial lack of clarity about the scope of the interventions to which the CRT had been committed in the GFA. The CRT then had to invest time in the initial stages of its work running forums with partners including CoWC and Active Black Country to determine how 'digital wayfinding' might be defined and operationalised. The forums developed the idea of the wayfinding app showing videos of the canal path routes. Subcontractors were procured directly to develop and deliver the app, and the CRT has expressed confidence that the app will be effective in guiding new and existing users to the network.

5.71 The significant issues with the procurement of key equipment were explored at length with the project team during the evaluation. In addition to the commentary above, it is important to note that the CoWC expects that it will still roll out a programme of installing sensors, with the converted lights providing sockets which effectively future proof the infrastructure for the later installation of new technology. This could include, for example, future installation of air quality sensors linked to a 4g network and data management infrastructure that already operates existing traffic cameras and sensors. The project team is clear that the sockets installed with the LED lights can be connected to other forms of sensors. This suggests that the project has assisted in future proofing the city's infrastructure for the further roll out of smart technologies.

Summary

5.72 The SI_3 project was clearly delivered during an exceptionally challenging period for the CoWC and the CRT, with the pandemic having fundamentally altered the environment for both the installation of new infrastructure and practical management of the project.

5.73 The main strengths of the project delivery arrangements and process highlighted in this chapter include the following:

- Ability of the Steering Group and the project management team to respond flexibly to the challenges that arose in procuring key equipment and contractors, with examples including actions to explore alternative technologies and decisions to secure additional installation resources via external providers.
- The configuration and role of the Steering Group which brought together senior decision makers and members of the project team leading project delivery. This benefited the

project in two ways, in that it ensured that delivery issues were identified and addressed systematically, and that it helped embed the project in the wider programme for the roll out of smart digital technology in the city.

- The benefit of CoWC being able to call on its wider resource of experienced project managers, including senior staff with ERDF experience. This helped ensure that key ERDF requirements on monitoring, reporting, procurement and compliance appear to have been met. This was reinforced by the use of tried and tested processes, including project management software, which CoWC and the CRT trusted to be effective.
- What appears to have been a positive partnership relationship between the CRT and CoWC. Involvement of the CRT's lead in the Steering Group was an important factor, but it was underpinned by CoWC's decision to work with a 'trusted partner' with previous experience of ERDF and infrastructure projects of this type.
- The embedding of the cross-cutting themes, and particularly the sustainability theme, in the project's design and implementation. The project benefited from a rationale, objectives and proposed activities which strongly aligned with the cross-cutting themes from the outset.

5.74 Several aspects of the project's delivery point to lessons the CoWC and CRT might learn from the experience in designing and delivery future projects:

- The challenge of recruiting and retaining experienced project managers. Whilst the 2014-20 ESIF programme will be the last ERDF programme delivered in the UK, this is a wider issue for the UK and for local authorities and other organisations involved in delivering publicly funded capital and revenue projects. Future planning might include incentives to attract and retain good quality project managers, and recognition in risk management and mitigation of the potential for such recruitments to be time consuming and challenging.
- Greater clarity in the project design and development process about the expected contribution of key delivery partners. In the case of the CRT and the digital wayfinding app the specification and requirements of the CRT to develop and deliver it could have been better defined.
- Recognition that the procurement and delivery of technologies which are changing rapidly brings challenges including the risk of early obsolescence, demand-supply imbalances and uncertainties around the effectiveness of technologies themselves (a form of information failure). This puts the onus on the need for flexibility about what might be procured, thorough investigation of alternative technologies at an early stage, and fall-back strategies if a preferred technology cannot be delivered.

5.75 The project fell short of delivering the full range of activity identified in the GFA. It cannot be concluded that this was directly attributable to weaknesses in its design, project management and delivery processes given the problems that Covid-19 created. However, there was perhaps a heightened risk that a project which sought to deliver what are still relatively novel technologies for the public sector in a UK context would encounter challenges where there are significant dependencies between those technologies (ie sensors and a CMS). This is an issue to consider as the CoWC continues to roll out its smart city programme.

6. Project Outcomes, Impacts and Value for Money

6.1 This chapter assesses the progress of the project towards achieving its key outcomes and impacts as specified in the logic model. The emerging impacts evidence is used to estimate the project's value for money (VfM), essentially the monetised benefits it would be expected to generate compared with the ERDF and public sector investment.

6.2 Alongside a quantitative impact and VfM assessment, the chapter also identifies the wider and non-monetised impacts the project has either generated already, or would be expected to do so in future. Given the challenges presented by the Covid-19 pandemic, these wider impacts have heightened relevance since the role of the project in preparing the city for the roll out of further smart technology is an important feature of what it could achieve.

6.3 As a result of data limitations explained in the chapter, the focus of the assessment is on the core outcomes and impacts the project set out to generate:

- Reduction in energy consumption in public sector infrastructure (street lighting);
- Associated reductions in greenhouse gas emissions.

6.4 These outcomes and impacts are driven by the project's two key outputs (C32 and C34). The impact assessment uses evidence that is consistent with the benchmark data, including conversion factors, applied by the project itself and which draw on UK Government

Data Limitations

6.5 There are a number of important caveats to highlight about the quantitative impact assessment:

6.6 **Energy savings and greenhouse gas emissions:** This is the key outcome of the project and is driven by the largest individual component of the project's investment (conversion of LED lights). The assessment quantifies the likely future impact of the conversion initiative, and does so using reasonable assumptions about change over a 5-year period which are set out in detail in the analysis.

6.7 **Improvements in air quality:** It is reasonable to assume that the project's investment in measures which are expected to reduce emissions and improve air quality will in time contribute to Wolverhampton's programme of action in this area. The two main drivers of this outcome and the benefits it delivers in terms of both reduced greenhouse gas emissions and improved health outcomes will be enhanced management of traffic to reduce pollution hotspots, and increases in active travel leading to falls in the use of cars to move around the city.

6.8 However, there is no means of quantifying the likely impacts of these measures. A network of new sensors was not delivered as part of the project, and it is too soon in the implementation of the canal network lighting and activity to encourage use walking and cycling for any initial data on which to base a projection. Analysis of baseline data for emissions in Wolverhampton from monitoring reports for the city's AQMA's provides evidence for those specific locations, but not data that provides a starting point for determining change across the area covered by the project's investments. To reflect these limitations. the assessment considers potential air quality improvements as part of the commentary on wider impacts.

6.9 **Impacts of increased active travel:** The pandemic significantly affected the movement of residents and the working population of Wolverhampton. This is reflected in the cycle data

provided to the evaluation which shows that movements fell during the pandemic and do not appear to have recovered to pre-pandemic levels. Since the completion of the solar lighting programme is still a recent development, there is no robust means of monetising the actual or potential impacts of this aspect of the project, which could be captured in the form of indicators such as time savings, health and well-being or reduced emissions.

6.10 Many variables will influence future changes in walking and cycling on the canal network, and isolating the contribution of the solar lighting roll out and the digital wayfinding app would require extensive survey data once a normalised post-Covid pattern of movement is reached and sustained. This is outside the scope of the evaluation and, in any event, would be of little value at this point in time since immediate behavioural changes are either very unlikely to have occurred, or would be limited to a very small number of users.

6.11 For this reason, the potential benefits of increases in active travel are considered as part of the wider impacts of the project.

Impact Assessment Methodology

6.12 The starting point was CoWC monitoring data generated for the project including:

- Energy (kWh) consumption of the original streetlights;
- Energy (kWh) consumption of the replacement LED lights.

6.13 The evaluation benefited from a comprehensive dataset which included each individual light conversion, the number of conversions completed, the timing of those conversions, and the relative energy consumption figures for each of the individual types of bulb. The impact modelling was built from this core data.

6.14 To determine the net change in energy consumption and associated GHG emissions (measured by tonnes of CO2 emissions), the following were modelled:

- **Reference Case:** Measuring the implied energy use and CO2 output assuming that no conversions were carried out.
- **Project Implementation:** Estimating energy consumption and CO2 output for the converted lighting.

6.15 Following discussion with the project team, a 5-year period was used to model the impacts of the conversions. This was driven by factors including the likely future availability of new technology which might deliver even more energy efficient lighting and the time period at which the existing lighting would have started to be replaced regardless of the project. However, the assessment also comments on the implications if the duration of the project's impacts were to be extended beyond 5 years.

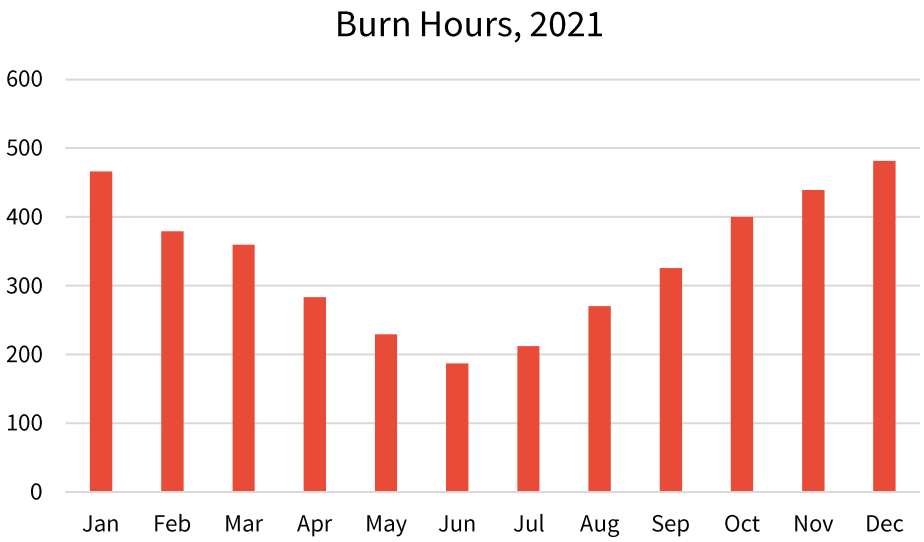
Assumptions

Reference Case

6.16 In the reference case, it is assumed that the 'burn hours' – the number of hours each month when the existing bulbs would be lit – followed a consistent monthly pattern based on the Council's own data. Since it provided data for burn hours in every month from May 2020 to September 2022, this pattern was used for that period in the model, with 2022's assumed burn hours used to project forward the profile for each year thereafter.

6.17 Since the Council provided detailed data on burn hours, this is a reasonable assumption to make in the projections. An example of the pattern is given in the figure below, which shows the monthly burn hours for existing lights in 2021. It was important to capture in the modelling that burn hours would rise and fall for all bulbs during the course of a year.

Figure 6.1 Burn Hours for Existing Lights, 2021



Source: City of Wolverhampton Council

6.18 For the reference case, it was assumed that, from the month in which existing lights were converted, the original bulbs would have burned for a further five years from that point. For example, for lights converted in June 2021, it assumed in the reference case that the existing lights continued to operate through to May 2026 (ie 5 years) at which point they would be converted anyway.

6.19 It is also important to note that all the lights eventually converted would have burned from May 2020 when the conversion programme began. For this reason, in the reference case the model counts the energy used for all lights from May 2020 (since they are assumed to be lit throughout the period) until their conversion, then for a further 5 years from that month of conversion.

6.20 The evaluation team considered an alternative approach in which all lights were assumed to be converted before May 2025. This would have the effect of reducing total energy consumption in the reference case, since no existing light would be assumed to operate beyond April 2025, resulting in lower total energy consumption than in the model's reference case which extends through to 2027 for the reasons described above.

Project Implementation

6.21 The following assumptions were made about the conversions carried out as a result of the project:

- Energy use and CO2 outputs from the existing lighting is counted from the start of the implementation process (May 2020) until the point at which the lights were replaced.
- From that replacement month onwards, the new energy use and associated CO2 output is counted for a 5-year period so that the reference case and the project implementation scenario are directly comparable.

- As per the reference case, the assessment drew on monthly burn hours data provided by CoWC. We assumed the burn hours for each of the new LED lampposts would follow the same monthly pattern each year. There are slight variations between the assumed burn hours for the existing and replacement lights. However, in virtually all months, the assumption is that the replacement bulbs burn for slightly longer than was the case for the existing bulbs, reflecting more efficient and effective technology. The implication is that the impacts of the replacements are not inflated by the assumption that they burn for fewer hours. The differences are a matter of a small number of additional hours rather than any significant change, and have no meaningful impact on the estimates.

6.22 The combination of the reference case and project implementation modelling provide a clear with and without picture on which to base the assessment.

Valuing Energy Savings and CO2 Emission Reductions

6.23 The two drivers of the project's impacts and value for money are the energy savings achieved through the LED lighting conversions, and the associated reductions in CO2 emissions that stem from this energy saving. Whilst the project used a straightforward methodology using UK government benchmarks and guidance on how to measure CO2 emissions savings, the evaluation draws on more recent UK government appraisal guidance to value these impacts. The Valuation of Energy Use and Greenhouse Gas guidance was published in October 2021 as a supplement to the HM Treasury Green Book. It provides both energy saving and CO2 emission values to apply in appraisal and is appropriate for the interventions delivered by the SI_3 project.[15]

6.24 The appraisal guidance specifies two methodologies for valuing the benefits of energy savings and reductions in CO2 emissions:

6.25 **Value of energy savings:** The starting point for measuring this benefit is to understand the net energy saving the project would generate by comparing the reference case and project implementation case. This energy saved is then valued through the application of a Long Run Variable Cost of Energy Supply (LRVC) to the energy saved in each year. This essentially represents the social benefit of energy savings. Values in the guidance are drawn from data tables provided with the guidance and are expressed in 2020 prices (pence per kWh).

6.26 The approach suggests an additional step which allows for a direct 'rebound' effect. This effectively discounts the value of energy saved further by accounting for the beneficiary's use of cost savings to consumer more energy. In the case of this project, the direct rebound effect would show itself in the converted lights being lit for a longer time.

6.27 However, our review of the project's monitoring data suggests that the new lights are not assumed in every month to burn for longer than the old lights. In some cases, the figures are lower. Where the new burn hours are higher, the differences are small or negligible. In addition, the model accounts for additional energy consumed by the new lights by taking account of the burn hours data provided by the Council. In other words, the additional energy consumed by the new lights (and its value) is already accounted for in the modelling. For these reasons we do not apply the direct rebound effect.

6.28 **Value of CO2 emission reductions:** The same UK government appraisal guidance is also used to value the reduction in CO2 (equivalent) emissions. The starting point is to establish the emissions savings (CO2e) that the energy saved by the project represents. The evaluation uses

[15] Department for Business, Energy and Industrial Strategy (October 2021) Valuation of Energy Use and Greenhouse Gas. This is the core publication and is supported by a series of background documents and data sheets.

data provided with the guidance which gives long-run marginal electricity emissions factors (KgCO2e per kWh). This is the same broad factor used by the project itself to quantify its CO2 emissions reduction target. However, the evaluation uses data emissions factors that change over time, reflecting in electricity consumption the role that changes in the UK's energy generation mix (including increase in renewables) will have in emissions.

6.29 The changes in the emissions factor over the assessment period (2020-27) essentially represent an additional deadweight factor external to the project's delivery. To account for this, the assessment compares the value of CO2e savings with the emissions factor fixed at its 2020 value with the values that result from the downward emissions factors provided in the appraisal guidance. This gives the value of the CO2e emissions reductions which would have occurred regardless of whether the old or new lights were installed.

6.30 The final step draws on the same appraisal guidance which gives carbon values (2020 prices, tonnes of CO2e) for the period from 2020 to 2027.

6.31 All benefits values are discounted in line with UK government appraisal guidance (ie 3.5% per annum).

Impact and VfM Summary

6.32 The implied energy use in each of the Reference Case and Project Implementation Case is shown the table below, together with the net saving the project delivers.

Table 6.1 Energy used, Reference Case and Project Implementation, Net Saving (gWh)

	2020	2021	2022	2023	2024	2025	2026	2027	Total
Reference Case	4.02	6.39	6.39	6.39	6.39	5.78	3.04	0.63	39.02
Project Implementation	3.60	4.19	2.84	2.51	2.51	2.34	1.37	0.31	19.66
Net Saving	0.42	2.20	3.55	3.87	3.87	3.45	1.67	0.32	19.35

Source: City of Wolverhampton Council, Hatch Calculations

6.33 The value of the energy saving and CO2e emission reduction benefits is set out in Table 6.2 below. They are expressed in current prices with the appropriate discount rate applied.

Table 6.2 Project Impacts Net of Reference Case (2022 prices)

Impact	Value
Net Energy Saving (gWh)	19.35
(A) Value of Energy Savings Impacts	**£1.36 million**
Tonnes of CO2e Emissions Reduced	4,711
Value of CO2e Emissions Saved	£1.16 million
(B) Value of CO2e Emissions Saved with Additional Deadweight	**£0.94 million**
Total Value of Benefits (A+B)	**£2.3 million**

6.34 The total monetised value of the two reported impacts, which are the value of energy and CO2e emissions saved, sums to £2.52 million. Accounting for the additional deadweight factor linked to projected changes in the UK energy mix reduces the value to £2.3 million.

6.35 The project's headline value for money (VfM) based on these two key indicators is 0.43 based on total project expenditure at September 2022, and 1.03 for the ERDF contribution to project costs only.

Table 6.3 Estimated Benefit Cost Ratios			
	Total Expenditure	Total Benefit	Benefit/Cost Ratio
Total Project Cost	£5.39 million	£2.3 million	0.43
ERDF Only	£2.21 million	£2.3 million	1.03

6.36 On the face of it, these figures represent low value for money for the project's investment. However, it must be recognised that the impacts assessed here are driven by only one component of the project's benefits. For reasons explained in the evaluation, it was not possible to assess wider benefits that the project has either generated already, or has the potential to deliver in future. This is the result of both the timing of the completion of activities including lighting the canal network and the digital app which have occurred only recently, and the effects of the pandemic which have brought substantial, short-term changes to how people travel in and around Wolverhampton.

6.37 Several benefits of the project have not yet been realised, but would be expected to deliver positive changes as the effects of the new and improved infrastructure take hold. These are briefly identified and described below:

Improved Air Quality

6.38 The CoWC has air quality monitoring data for locations in the city (AQMA) which are subject to air quality management measures. However, the effects of the pandemic in which traffic movements and active travel had not yet returned to pre-pandemic levels for much of the project means that there was no data which would demonstrate any positive impact (or otherwise) which could be attributed to the project.

6.39 Drivers of localised improvements in air quality which might in time arise from the project include:

6.40 **Modal Shift:** Increases in active travel and associated reductions in car use by residents, the city's workforce and visitors. Given the project's investments, these would be concentrated around the role of the canal network and its use in the early morning and evening when it is assumed that usage would rise because the towpaths and tunnels are lit, and therefore safer. As yet, no data is available to show whether and the extent to which there have been increases in walking and cycling on the network as a result of the lighting and digital app. The latter was completed very recently and so no sustained usage data is available.

6.41 **Reduced Congestion:** This is related to modal change but may also result from the future installation of additional traffic movement monitoring and management technology that the project has enabled. Any positive impacts on air quality would arise from improved traffic flow management which reduces stationary traffic at pollution hot spots in the city centre, and which diverts traffic away from heavily polluted areas when air quality is identified as being particularly poor.

Additional CO2 emissions reductions

6.42 Related to the positive effects that increases in active travel could generate on air quality, modal shift would also contribute to additional impacts on the city's GHG emissions, and therefore to its contribution to net zero and climate change-related targets. These would be additional to the impacts which are driven by the LED lighting programme.

6.43 The CoWC indicated in the application that it has previously applied a methodology for valuing the CO2 emissions savings generated by additional cycling mileage in the city. Ideally, assessing

this benefit for the project would be based on both monitoring data from cycle counters and, more importantly, survey evidence showing how cyclists have changed their activity as a result of the project.

Health and well-being benefits

6.44 It is reasonable to assume that improved active travel infrastructure and its promotion will have positive impacts on the health and well-being of residents who either increase their walking and cycling activity as a result of the improvements to the canal network's useability, or who switch from car or other vehicle use to cycling and walking to move around the city centre.

6.45 An extensive literature points to positive effects on physical and mental health associated with more active lifestyles, including walking and cycling activity.[16] These identify effects including cost savings to the public sector through reduced need for health care intervention and quality of life/happiness values.

6.46 The UK government's Active Mode Appraisal Toolkit (AMAT) provides a robust appraisal model that would assist the project in capturing these benefits (and others relating to increases in active travel) once any sustained change becomes evident.

6.47 The key challenge would be isolating the impact of the project from the wide range of factors that are likely also to contribute to model change. These include the continuing rise in fuel costs, ongoing shifts in working patterns including hybrid and home working, further investments in cycling and walking infrastructure around the city, and measures to encourage healthy lifestyles promoted in the city.

Place-making

6.48 A further effect of the project's infrastructure investment will be a positive contribution to improving the quality of the physical environment in Wolverhampton. New and improved lighting, including extending the useable hours on the canal network's towpaths, and the future installation of smart technology to improve connectivity and city centre management, will in combination deliver place-making benefits.

6.49 There is no single method for assessing benefits of this type. A wide range of indicators capture changes which arise from improvements in quality of place. These include, for example, higher residential and commercial land and property values, increases in footfall and its effect on business performance, increases in private and public development investment, a higher and more positive external profile of a place and increases in employment and the size of a resident workforce if more people are attracted to a place.

6.50 The impacts of the project itself on place-making are likely to be very modest, and would be difficult to quantify given the extensive range of other investments which are ongoing in Wolverhampton. However, it is a type of benefit which should be recognised.

[16] See for example Fields in Trust (2018) Revaluing Parks and Green Space which states that the reduction in GP visits by park users presents an aggregate Exchequer cost saving to the NHS of £3.16 per-person; DCMS (2014) Quantifying and Valuing the Wellbeing Impacts of Culture and Sport, which draws on survey evidence on life satisfaction and happiness to attach values to exercise, sporting participation etc.

Summary

6.51 The evaluation's assessment of the project's impacts and value for money centres on the energy savings and associated benefits to CO2e emission reductions which are being achieved through the lighting conversion programme. This is the main activity delivered by the project and accounts for a substantial majority of its investments.

6.52 Building on the comprehensive monitoring data provided by the CoWC, the evaluation points to net impacts as follows:

- Net energy saving of 19.3 gWh over a 5-year appraisal period;
- A net value of £1.36 million representing the impact of energy saved;
- 4,700 tonnes of CO2e emissions saved;
- A value of £0.94 million for the CO2e emissions saved.

6.53 This results in BCRs of 0.47 (total project expenditure) and 1.03 (ERDF expenditure only) for the project based on these two impact measures.

6.54 Whilst this represents low BCRs, the project is likely to deliver a wider range of benefits which it was not possible to capture in the evaluation, but which represent long-term, positive changes to which it will contribute. These include improvements in air quality, further savings in CO2e emissions, health and well-being benefits and place-making benefits. In addition, it should be recognised that the infrastructure delivered by the project will enable further investment in smart technology, contributing to the roll-out of the ambitious strategy for Wolverhampton.

7. Conclusions and Recommendations

7.1 This chapter draws together the conclusions and recommendations from the evaluation. They are framed around each of the five Summative Assessment themes. It identifies key lessons learned from project delivery for CoWC and the CRT, and recommendations which might guide the partners and others developing and implementing similar projects in future.

Conclusions

Project Relevance and Consistency

7.2 **Appropriately designed to meet its objectives**: The evaluation points to a project which was well designed to meet the objectives identified by CoWC and its partner organisation the CRT. The central objective was to develop a new city-wide network of digital infrastructure to reduce energy consumption, increase renewables and promote behaviour change in multi-modal transport options. The project's design was rooted in PA4 and the ESIF's Strategic Investment Areas, with a direct and clear purpose in delivering energy efficiency and reduced CO2 emissions, and also in contributing to blue-green infrastructure improvement through objectives relating to the canal network. The core activities designed into the project were clearly focused on infrastructure that would help to deliver its objectives.

7.3 **Well-aligned with policy, and relevance increased as the context changed:** The project's design benefited from being driven by a team within CoWC which was centrally involved in Digital Wolverhampton and the smart city programme, and which had a background of working on ERDF programmes. It demonstrated a strong strategic fit with local, regional and national policy. Already well-aligned with policy at the application stage, the project's relevance increased during its delivery phase. In one regard, this stemmed from the Covid-19 pandemic which reinforced the importance of cycling and walking during lockdown restrictions. However, new and enhanced global, national and regional commitments to tackling climate change, including Wolverhampton's declaration of a climate emergency and the UK government's Net Zero position underlined the relevance of the project whilst it was being delivered.

7.4 **Sound market failure rationale**: The market failure rationale for the project was clear. No mechanism is yet established to price the social cost of greenhouse gas emissions (an externality) and pass this cost to domestic or industrial generators of emissions. There are also recognised information failures for businesses and consumers in the development and take-up of smart technologies and those which contribute to reducing CO2 emissions, and no accepted means of valuing the social costs and benefits of measures to reduce them. In these conditions, the case for public sector intervention is strong.

7.5 **Lack of specificity about some project targets:** Project target outputs set out in the GFA were not sufficiently clear and there were errors in their calculation which needed to be addressed by PCRs. The evaluation also concludes that the application should have provided more detail about the baseline position against which changes resulting from the delivery of project activities could be measured. Whilst in practice the project's monitoring of output progress is clear and detailed about how conversions on the lighting network changed energy use, there were gaps in the overall baseline information around current power consumption and CO2 emissions, active travel and air quality. It should be recognized that the types of behavioural change the project sought to encourage (eg. switch to active modes of travel) are difficult to predict, but the application would have benefited from more specificity about individual

measures of change, and how this might be reflected in key socio-economic indicators to capture the project's outcomes and impacts over the medium to longer-term.

Progress Against Contractual Targets

7.6 **Two Project Change Requests (PCR) were necessary:** The project was justified in seeking approval for two PCRs. How far the delays to the signature of the GFA and the appointment of the project manager could have been avoided was not possible for the evaluation to firmly establish since key personnel had left CoWC before the report was produced. However, the impacts of the Covid-19 pandemic were a more significant factor, and seeking an extension to the project's completion deadline, some reprofiling of expenditure and outputs, and some limited vireing across expenditure categories, was a necessary response. Without the PCRs, it is likely the project would have fallen well short of its spending target.

7.7 It is also important to note that weaknesses in setting output targets at the application stage were corrected by the first PCR. Addressing this issue at a relatively early stage in project delivery prevented bigger challenges later in the project if it had significantly under or over-reported its performance on the basis of incorrect measures. The initial error in the estimate of kWh of energy saved was a substantial one

7.8 **Final underspend against project target**: The evaluation identifies an underspend of £0.47 million at the end of September 2022, representing around 8% of the project's total expenditure target of £5.86 million. In large part this is attributed to the project's inability to procure the CMS and to the ineligibility of planned EV charging infrastructure which also did not proceed. There is no indication that the issue with the CMS could have been foreseen at the application stage.

7.9 **Outputs targets were exceeded:** The project has exceeded both its output targets (C32 and C34) on the basis of the methodology agreed with the Managing Authority. At 4.8 million kWh saved, the energy saving target (C32) was exceeded by around 24%. Since the Greenhouse Gas emissions reduction target (C34) is driven by energy savings, this was also exceeded by 24% at a 1,239 tonne reduction in CO2 emissions associated with the light conversions. Analysis for the evaluation indicates that the project is likely to have understated its achievements against these targets, since its methodology does not take account of changes in the average number of hours during which lights are using energy over the course of a year.

7.10 **Other outputs and outcomes could have been captured:** Whilst the project exceeded its ERDF output targets, a wider range of activity it delivered beyond the LED conversions was not systematically captured beyond monitoring the equipment and infrastructure delivered (for example, the 12km of solar lighting installed on the canal network, cycle counters).

7.11 In large part, this is attributable to a combination of the lack of reliable baseline data to measure changes in usage over a period when the Covid-19 pandemic severely affected the movement of people around Wolverhampton, and to the delays that the pandemic caused to the procurement and completion of works. In this regard, much of the project's activity outside the light conversion programme was completed in late 2021 or in 2022. It is therefore too soon to identify discernible changes from (for example) people switching from car travel to cycling or walking in the city centre, and the related effects of modal changes on air quality, congestion, health and well-being. The limited evidence from cycle counters on the canal network does not yet suggest that there has been an increase in use of the network, but it is reasonable to expect that to occur in future years. The evaluation makes specific recommendations about measuring future impacts.

Project Delivery and Management

7.12 **Project governance and management was flexible and effective despite significant challenges:** The evaluation describes a series of exceptional factors which affected its delivery from the outset in 2020, principally the Covid-19 pandemic's effects on procurement and the working pattern of project staff, but also significant delays in finalising the GFA, difficulties securing an experienced ERDF project manager, and a series of departures of key staff during the course of the project. The City of Wolverhampton Council responded by ensuring that senior staff with ERDF experience covered project governance and management, backed by a wider project management resource from within the authority. Similarly, despite its own challenges in terms of the continuity of staff, the CRT brought an experienced project management team with ERDF experience to drive the delivery of its activities.

7.13 **Willingness to quickly identify and explore alternatives to key procurements:** Faced with problems in procuring key equipment – most notably the CMS – the evaluation found that the project team had actively sought alternative routes to securing equipment or alternative technologies which might deliver similar results. Most of these alternatives did not prove feasible, and this points to a key challenge for projects of this type where integrated and dependent technologies are required to achieve project objectives.

7.14 **Project benefited from senior decision makers and project team members on Steering Group:** The presence on the Steering Group of both senior decision makers in CoWC and lead project delivery team members helped both to ensure that the challenges the project faced were identified and addressed systematically, and that the project was well-integrated into the Council's wider smart infrastructure strategy for the city.

7.15 **Project systems and processes benefited from CoWC's and CRT's experience of delivering ERDF project:** Key ERDF requirements on monitoring, reporting, procurement and compliance appear to have been met by the project. The evaluation suggests that this was in large part attributable to the CoWC and CRT having well-established and effective project management systems and processes, including project management software.

7.16 **High turnover of staff affected continuity of project management and delivery:** Whilst the evaluation was provided with a comprehensive set of data on expenditure and outputs, it is apparent that interim project managers and the senior team were faced with some discontinuities in the collection and reporting of expenditure and outputs data, and of progress in delivering project activities. Whilst these do not appear to have affected the project's ability to meet its reporting requirements, there are periods particularly during the early stages of the project when some of the detail about the factors affecting progress and how these were resolved is perhaps less clear.

7.17 **Positive working relationship between CoWC and CRT:** The project clearly benefited from working with a partner with previous ERDF experience and an organisation that was regarded as a trusted partner. The evaluation suggests that the relationship was a positive one, benefiting from the presence of the CRT's lead on the Steering Group.

7.18 **Cross-cutting themes well-embedded in project design and delivery:** Sustainability is central to the SI_3 project. Both its objective and the activities it delivered were directed at reducing energy consumption and CO2 emissions from key infrastructure and promoting increases in low and zero carbon movement in the city. There is strong alignment between the project and both national and city sustainability policies, and the project is explicitly identified as contributing to priorities identified in local strategies.

7.19 The equalities and diversities CCT was less directly delivered by the project. However, the CoWC is clear that the roll out of smart technology that better enables residents to access Wi-Fi, measures which are intended to help improve the quality of life of residents, and targeted activities which supports excluded or harder to reach groups to access services are objectives of the programme. The conversion of the lights, the canal lighting programme, the app and investment to encourage more walking and cycling are changes which should be accessible to a substantial majority of the city's resident and working population, and in this regard are consistent with the principles of the CCT.

7.20 **Equipment and activity delivered was substantially different to the proposed activity:** The project was clear that several of the activities it proposed to deliver could not be completed, and the evaluation has commented extensively on them. Whilst this did not prevent the project from achieving its target outputs, it is clear that the circumstances in which individual proposed activities were not implemented presented difficulties throughout the project delivery period.

7.21 Whether or not these issues could have been foreseen at the application and GFA stage was difficult for the evaluation to establish, since the personnel involved in designing and running the project at the application stage had moved on.

- CMS – The inability of the project to procure the CMS could not have been foreseen in 2017-18, although it perhaps highlights the additional challenges which securing relatively new and advanced technology presents.
- Cycle Counters and Display Panels – There was some lack of clarity about how many cycle counters the project would install. In the GFA the figure is seven but the project reports that three were delivered with project funding, with a further three delivered by the CRT. It is understood that a number of display panels were also delivered by the CRT which may explain the seven items identified under this heading.
- EV Charging Points – Clarification that this was not an eligible capital investment for ERDF because of state aid rules was only secured after the GFA and the start of project delivery. Again, it was not possible for the evaluation to establish whether this could have been foreseen, although the description provided in consultations suggest that this was not the case.

7.22 The evaluation comments further on lessons for the future which might be considered as a result of these experiences.

Project Impacts and Value for Money

7.23 The evaluation's impact assessment focuses in particular on the impacts of the lighting conversion programme. This accounts for the majority of the project's investments in infrastructure, and in the circumstances which the project faced during its delivery, was the component of the project for which robust monitoring data could be generated.

7.24 The impact assessment estimates that the project will deliver energy savings amounting to 19 gWh over a 5-year appraisal period, with a value of £1.3 million, and CO2e emissions savings of 4,700 tonnes with a value of £0.94 million.

7.25 This results in BCRs of 0.47 for total project expenditure, and 1.03 for the ERDF expenditure only.

7.26 Whilst the VfM assessment essentially focuses on the component of activities that accounts for the majority of the project's expenditure (light conversions), the evaluation points to several important, wider benefits which are not monetised in the assessment. These are short, medium

and long-term benefits which should be recognised, and which the CoWC and CRT should look to capture in future years. They revolve around two aspects of what the project has delivered:

7.27 **Technology readiness and future proofing:** By installing adaptable infrastructure, and particularly the inclusion of sockets on converted light posts, the CoWC has set out to enable the future installation of sensors and other digital equipment which will enhance the roll out of smart technologies in the city, and contribute to improved access to both high speed internet connections and information for the stakeholders, residents and businesses.

7.28 **Active travel and modal shift:** The CRT's completion of 12km of solar lighting on the canal network (towards the end of 2021), the installation of cycle counters and display boards and the recent development of the digital wayfinding app have the potential to combine to encourage more of the city's residents, workforce and visitors to opt for cycling and walking to move into and around the centre of the city. Uptake of these options and significant increases in active travel will generate future benefits that realistically include reduced congestion, improvements in air quality and reduced CO2 emissions, improved health and wellbeing associated with exercise and outdoor activity, place making and footfall benefits to businesses in the town.

7.29 At the time the evaluation was completed, it was too soon after the completion of the works to establish any change linked to the project, and data about modal shifts was not available. In any event, post-pandemic movement patterns do not appear yet to have returned to fully normalised pre-Covid levels.

Lessons Learnt and Recommendations

7.30 In several respects the conditions in which the project was delivered were atypical for any intervention. The lessons learned and recommendations for the future therefore focus on issues which do not revolve around the challenges that arose as a result of the Covid-19 pandemic.

Ensure infrastructure investment is future proofed

7.31 The project has directly contributed to preparing an important part of the city's public infrastructure for further investment and the activation of smart technologies. The Council and the city's commitment to the smart city concept is clearly well-established and regarded as a priority by stakeholders. There is a lesson here about investing in infrastructure that offers the flexibility to adapt to changing technologies and the opportunities that both hardware and data management software offer.

Recommendation 1: Identify early opportunities to capitalise on the LED lighting infrastructure and commit investment to installing new equipment on the network

Recognise the risks of fast developing and dependent technologies

7.32 Whilst it was outside the scope of the evaluation to examine in detail the specific technologies it installed, the project committed to delivering both hardware and related management systems which are part of a rapidly evolving landscape. Globally, advances in smart technologies are responding to growing demand, backed by innovation in product design and materials, and associated computing technology and software. The lesson here is perhaps that commitments to specific types of technology and products may quickly be overtaken by new developments in the market, and potentially their availability. The evaluation does not suggest

that the failure to procure the CMS could have been foreseen, but it does underline the need for flexibility and alternative strategies to respond to such changes.

Recommendation 2: As part of risk assessment at project application stage, consider alternative scenarios to achieve project objectives and assess availability of other technologies, including some foresighting of new developments

Review the process for recruiting and retaining valuable project managers

7.33 The third lesson centres on the evident challenge that CoWC and many public sector organisations face in the UK currently in terms of the availability of skilled and experienced project managers. This is coupled with a post-Covid environment in which the turnover of staff and the availability of labour has become a significant issue in the UK, although it is not clear whether this will be a lasting issue.

7.34 CoWC's resources and experience enabled it to cover staff departures without substantially compromising project delivery, although this clearly put additional pressure on existing staff. However, there may be some points for reflection about how the Council secures essential project management capability for future projects and how it retains this for the duration of a project. From the perspective of an external evaluator, it is easy make a recommendation of this kind, but the financial constraints on public bodies and the tightness of the labour market are recognised.

Recommendation 3: Review recruitment and package for project managers, and consider salaries, incentives and other support to improve retention of staff; ensure that existing staff are trained to assume project management roles where recruitment and retention is challenging

Collect focused baseline data at an early stage of project delivery

7.35 This is perhaps one of the weaknesses of the project in some respects. The Covid-19 pandemic clearly affected the activity such as cycling and vehicle movements that the project sought to capture through its delivery period. Critical baseline data, particularly the energy consumption of the existing lighting, was comprehensive and up to date. However, other baseline data including air quality data and cycling movements which were relevant to understanding what change the project generated were limited or not available for the specific locations in which project activity was implemented.

7.36 This points to the need for clarity around the specific baseline data that would be essential for all interventions, and a process for collecting and presenting it to be implemented at an early stage. The project's application was not sufficiently clear about what baseline data would be used for some activities, and where responsibility for assembling it lay.

Recommendation 4: Ensure that baseline data requirements and sources are clearly specified at the application stage, that it is feasible to collect the data, and that it is clear where responsibility lies

Provide specifications on delivery requirements for delivery partners

7.37 The CRT's experience of the project appears to have been a positive one, with the only notable issue raised the lack of clarity about the scope and specification of the wayfinding app identified

as an activity in the GFA. This appears to have resulted in part from the departure from their organisations of CoWC and CRT staff involved in project development. When the CRT subsequently sought to design and deliver the app, the lack of a clear specification contributed to delays.

Recommendation 5: As far as possible, provide detailed descriptions and specifications for activities that will be implemented by delivery partners

Fix output calculation methodologies at the application stage

7.38 Although the project's achievement of its output targets does not appear to have been adversely affected, the need to revise target output figures substantially in the PCRs suggests that the methodology was insufficiently tested and verified at the application stage. Errors can occur where a project is using external benchmark data and guidance linked to project activities to estimate outputs. However, the extent of the difference in the project's original estimates suggests that the miscalculation was a significant one which should have been identified prior to the GFA.

Recommendation 6: Assign responsibilities on the application team to individuals who will scrutinise and test output/result methodologies and ensure they are robust at the point of the GFA

Establish a process and resources for capturing wider project benefits

7.39 There is a risk that the delivery challenges faced by the project, including the delays in completing procurements and installing new equipment, mean that it fails to capture the lasting benefits the investment is likely to generate.

7.40 This is not a straightforward task, and is one which has been made more complex by the impacts of the pandemic. The CoWC and CRT should draw on the monitoring hardware already installed (ie cycle counters, air quality monitors) and consider the additional data which the city's other monitoring infrastructure including sensors already collects. This should be collected and regularly reviewed to identify any evident changes as the completed project takes full effect.

7.41 However, to fully understand the project's wider benefits requires an understanding of how much change is directly attributable to it. This is a more complex challenge which is best achieved through a combination of primary count and measurement data (eg. air quality, cycling activity, traffic movements) and survey evidence to establish why behaviours have changed and the extent to which the project's infrastructure contributed. This points to a planned and resourced exercise to monitor change over a number of years.

Recommendation 7: CoWC and CRT teams should agree a data collection process post-project completion, and assess potential to generate survey evidence on use of installed and improved infrastructure

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