

# **Buckinghamshire Live Lab** *Trial* *Final Business Case & Impact* *Assessment*

**Environmental Sensors**





## Strategic Case (1)

The Strategic Case sets out why the intervention is needed, how it furthers national, regional and local policy and whether there is a clear case for change.

National, regional and local policy fit	This intervention will contribute to Buckinghamshire Council's objectives of a connected, growing, healthy, sustainable and empowered Buckinghamshire, as outlined in Buckinghamshire's Local Transport Plan 4 (LTP4).
The case for intervention that meets those policy needs	<p>The intervention will provide Buckinghamshire Council with timely and accurate data collected remotely from a variety of Internet of Things (IoT) sensors which has the potential to better inform operational, tactical and strategic decisions to contribute to the LTP 4 objectives by:</p> <ul style="list-style-type: none"> <li>▪ Improving response time to asset failures and efficient optimisation of resource and maintenance budgets;</li> <li>▪ Improving air quality and reduction of congestion hence improve residents' health and quality of life;</li> <li>▪ Helping road users and network operators plan and navigate through difficult weather conditions hence reducing no. incidents, reduce congestion and creating a safe transport network;</li> <li>▪ Increasing use of active travel i.e. cycling and walking;</li> <li>▪ Tackling crime; and</li> <li>▪ Promoting connectivity, new technology and innovation.</li> </ul>
The national, regional & local needs and challenges	In common with many local authorities, Buckinghamshire Council is facing continued budgetary pressures, whilst facing growing demand to address issues such as congestion, improve access to public transport, improve air quality and deliver effective, efficient asset management.
The wider case for the intervention	It is anticipated that real-time environmental monitoring will provide a better understanding of localised conditions hence informing strategic decision-making and supporting Buckinghamshire Council's objectives of improved connectivity, safety and sustainability. For example, installation of micro-climate sensors will inform both transport network users and managers of hazardous weather conditions such as fog or ice, enabling improved safety and reduced congestion.



## Strategic Case (2)



### Strategic

Push for innovative environmental solutions to existing problems.



### Financial

Operational cost saving in the long term after initial capital expenditure.



### Environmental

Air quality monitoring facilitating improved decision making for cutting greenhouse gas emissions.



### Management

Increasing innovative solutions within the Council's operations to expand the knowledge base.



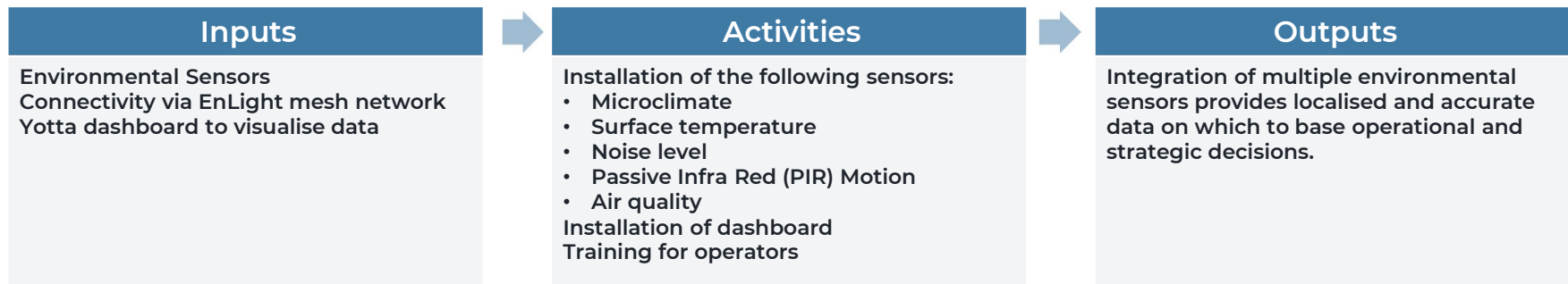
### Climate Change

Provision of sustainable and resilient solutions through better understanding of micro-climate.



## Strategic Case (3)

The Logic Impact model shows how the inputs and activities carried out during the trial flow through to short, medium and long term impacts. Where trials are not yet operational, anticipated impacts are provided.



Planned work

Outcomes – Impact		
Short-term	Medium-term	Long-term
<ul style="list-style-type: none"> <li>• Improved response time to asset failures and optimisation of resource and maintenance budgets;</li> <li>• Air quality monitoring allows the Council to implement measures to reduce air pollution.</li> </ul>	<ul style="list-style-type: none"> <li>• Integration of air pollution sensors with traffic signals will reduce congestion and improve air quality.</li> <li>• Monitoring weather conditions allows for effective decision making by transport network managers and improved safety.</li> <li>• Reduced costs resulting from congestion and delays.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved public health due to improved air quality. May result in reduced expenditure on health care.</li> <li>• Foundation for developing further technologies e.g. digital signage triggered by PIR motion sensors.</li> <li>• Improved customer services and economic growth.</li> </ul>

Intended results



## Economic Case - Costs

- The cost of sensors were not separated out from the cost of the mesh communications network.
- However, based on experience from similar projects, the capital cost (excluding communications, power, installation, maintenance and operational costs) of the 55 environmental sensors is likely to be in the region of £50k – £70k which is reported to be affordable by the Council





## Economic Case – Benefits realised through the trial

Trial not fully installed yet. The trial which was originally due to end in Nov 2021 has been delayed and both EnSense and Air Quality packs have not been installed to date. Regarding the EnSense Packs, the design and integration work for the platform has been completed by the manufacturer, awaiting Contractor resource availability to install and deploy.

As for the Air Quality packs, all the software integration work has been carried out by a third-party overseas supplier, however, COVID restrictions impacted hugely on the lead times to obtain the products and therefore are not available for installation yet. The packs will be available for installation once they are shipped to the UK in due course (shipping date is yet to be confirmed). However, the following benefits are anticipated:

### Monetisable

- Not applicable, the short duration of the trial will not allow enough time to realise any monetisable benefits.

### Quantifiable, not monetisable

- Not applicable, the short duration of the trial will not allow enough time to realise any quantifiable benefits. However, the nature of data being collected should contribute to improved information for environmental decision making.

### Qualitative

- Demonstrate that the data being collected has the potential to improve decision-making and promote innovation.
- Demonstrate the sensors are capturing high-quality, accurate, real-time data.



## Commercial Case

### Procurement journey

Buckinghamshire Council reported the following lessons learned with regards to procurement and market reaction to the environmental sensors:

- The standard Buckinghamshire Council contract was not appropriate to the small contract size. The standard terms and conditions were seen as onerous for small companies and procurement discussions delayed the overall programme.
- Suppliers sought different levels of intellectual property rights which led to contract agreement challenges.
- Small companies can face greater challenges with scaling up delivery to meet programme requirements. Payment milestones must be clearly worded and aligned with the reality of the delivery. Supplier's cash flow issues delayed delivery of the sensors.

### Implementation efficiency

The implementation timetable of the environmental sensors was reliant on the implementation of the mesh communications network which was substantially delayed.

COVID-19 also impacted on supply chains, particularly with equipment manufactured in overseas. This impacted hugely on the lead times to obtain the products (air quality packs) which are not yet available for installation.

Purchasing data from other sources rather than investing in sensor technology may be a more efficient solution and needs further investigation. This could include floating vehicle data from third-party providers (e.g. Here, INRIX, Google and Tom-Tom) and safety related data from vehicle manufacturers.





## Financial Case

### Affordability

The environmental sensors and mesh network were procured as a joint package rather than separately priced. Based on experience from similar projects, the capital cost (excluding communications, power, installation, maintenance and operational costs) of the 55 number of sensors only is likely to be in the region of £50k – £70k which is reported to be affordable by the Council for the benefits envisaged.

The operational duration of the trial is too short to recoup the investment costs (*compared to alternative traditional means of gathering the same information*).

### Financial model

The trial relied on the bespoke mesh communications network. It is likely that a more cost effective solution and reduced-risk approach would be to use commercially available communication networks, such as 5G, rather than a bespoke solution.

### Funding sources

Funding for the trial was provided by the ADEPT Live Labs programme.







## Management Case (1)

### Project management approach

Overall, BC commissioned a significant number of new technologies rather than procuring a few system integrators, on reflection this increased management time for the authority and increased the level of risk. The difficulty, project management resources and timescales involved in procuring innovative technology solutions in volume from small businesses were also underestimated and required considerable relationship management.

### Delivery plan

The delivery plan was not met, which meant it has not been possible to evaluate the trial. This was largely due to reliance on the bespoke mesh network the installation of which was delayed, in addition to, sourcing of the air quality packs from overseas which is delayed due to the prolonged lead-times effected by Covid restrictions.

### Project management team and qualifications

It is recommended that this form of trial includes experience in the project management team of integrating solutions across a range of suppliers. Ideally a primary systems integrator should be appointed who leads the technical delivery and manages the risks for the Council.

In addition, officers in the project and environmental teams need to be upskilled to be able to visualise the data, read dashboards and react to data.





## Management Case (2)

### Benefit realisation and contract management plan

It's important to get buy-in from internal users from the outset (e.g. the environmental team). They should contribute to use cases, agree the technology end to end solution and agree on the success criteria of the trial. A champion from that team should lead the integration the operational trial into a business as usual state (training, process changes etc).

### Evaluation strategy

Locations were selected to align with other initiatives such as Greenway & Aylesbury Garden Town rather than evaluating optimal locations for the trial where real time environmental data would add the most value for addressing the real challenges of Buckinghamshire Council.

