Appendix 2: Technical Briefing on Streetlighting Trials

1. Street Lighting Network

Slough Borough Council's Street Lighting Network consists of more than 13,400 street lights, signs and bollards, with more than 11,600 street lights controlled by two types of drivers: nodes and sub-masters. The nodes are small cylindrical units on top of the majority of the street light lamps, and the sub-masters are larger cylindrical units that can control up to 500 nodes and communicate directly with our Mayflower Central Management System (CMS).

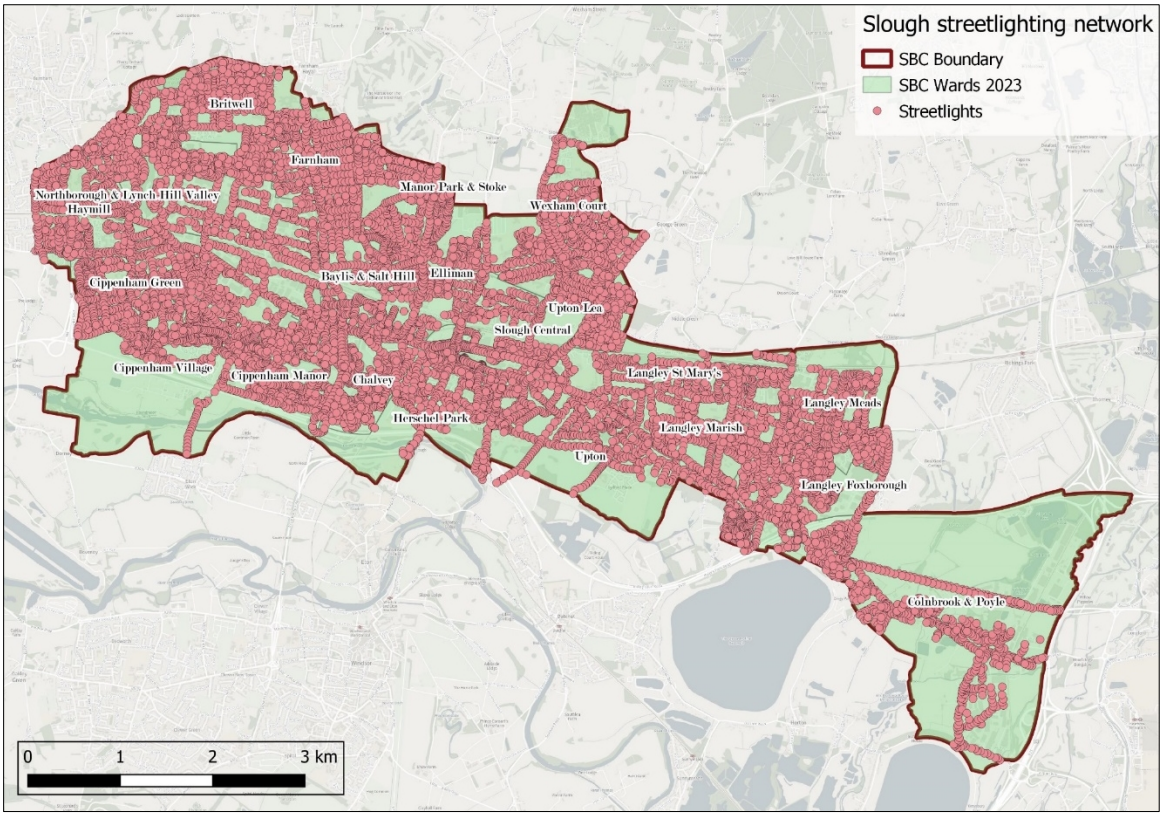

Figure 1 SBC Street Lighting Network

2. Methodology & trial setup

Based on the recommendations of the British Standards BS 5489 and BS 13201, as well as national best practice set out in the Institute of Lighting Professionals' Professional Lighting Guide PLG08 "Guidance on the Application of Adaptive Lighting within the Public Realm", we chose several distinct zones for each of our three trials.

The chosen trial zones are largely residential and are located away from other external sources of light. They were also picked to have similar lighting unit profiles, and heights to each other, and to include enough nodes to assess illumination. It was also agreed during trial 1 no main roads, junctions, and the high streets would have their lighting levels adjusted. However, during the second trial, two small sections of two different A roads were included to assess illumination.

Due to several issues with sub-masters' faults during the first trial, the second trial zones were chosen in areas where the sub-masters were operational. By the third trial, all the faulty sub-masters were replaced and the zones were chosen in new locations not previously trialled.

3. Field observations

Without having access to the Mayflower CMS and without a contract in place to allocate responsibility on Enerveo to take charge of any network glitches during the trial, a field survey was scheduled to take place.

A council officer was tasked with visiting set locations within each trial zone and measure the light intensity (lux) from the exact same spot throughout the change in the different lighting profiles.

Surveys were carried out for trial one and two, within each trial zone.

The first night carrying out the surveys during trial one was also used to drive around the entirety of each trial zone and record any faulty lights; switched off or knocked over. In the subsequent nights, it was obvious, from driving around the borough multiple times, that numerous lights were not lit and needed replacing or repairing, not just those lights in the trial zones.

Further observations were made each week during the survey sessions, including the overall perceived visibility throughout the trial areas and at each survey location. Thus, a perceived visibility scale was developed to gauge the overall illumination levels in the trial zones.

Perceived visibility	Description
1	Almost no visibility: the overall brightness in the area is inadequate for safe transit on foot.
2	Insufficient visibility: the overall brightness in the area is insufficient, transit on foot is difficult.
3	Sufficient visibility: the overall brightness in the area is considerably less illuminated, but safe transit on foot can be achieved easily.
4	Good visibility: the overall brightness in the area is satisfactory with minimal additional sources of light contributing; safe transit on foot can be achieved effortlessly.
5	Very good visibility: the overall brightness in the area is perfect for transit on foot, reading signs and car registration numbers; some other sources of light might be present.
5+	Extreme visibility: the overall brightness in the area borders on uncomfortable; light pollution is evident.

TRIAL I

The first trial was set commenced on the 17th February 2023 and to be completed by the 31st March 2023. The four trial zones and the control were set in Rochford Gardens & Goodman Park, Maplin Park, Colnbrook, Cippenham and Britwell.

During this initial trial, several shortcomings were identified, that could interfere with any future trials and the running of the Street Lighting Network on a daily basis. The Council did not have and still doesn't have an in-house lighting engineer and no trained officers required to access, monitor and update the Mayflower CMS. Thus, any work required to program and update the Street Lighting Network was dependent on experts from Enerveo. Also, before the start of the trials, SBC did not have full access to the Mayflower CMS, and there was no active contract in place with Enerveo to update and maintain the light inventory on the CMS.

Thus, in order to setup the first trial we employed Enerveo's services to reprogram the lighting profiles for the initial four trial zones (up to 996 lights). With the help of Enerveo, the adaptive street lighting trial took place according to the schedule set out in the table 1 below.

Table 1 Lighting Scenarios

Scenario	Dusk to 10pm	10pm to midnight	Midnight to 5am	5am to dawn	Duration
3 Residential - Stepped Lighting Scenarios: Trial Zone A, B & C *1 Control: Trial Zone D*					
Lighting profile 1	70% (baseline)	60%	50%	70%	9 days
Lighting profile 2	60%	50%	40%	60%	9 days
Lighting profile 3	60%	50%	30%	50%	9 days
Lighting profile 4	50%	40%	30%	50%	9 days
	Dusk	**Dawn**			
1 Residential (Dusk to Dawn): Trial Zone E					
Lighting Profile 1	60%		-	-	12 days
Lighting Profile 2	50%		-	-	12 days
Lighting Profile 3	40%		-	-	12 days

A similar trial was initiated in 2018, and at the time the police and emergency services were engaged to take part and provide feedback. Then, the Communication Team advised that the public didn't have to be informed of the trial, although the Disability Forum was made aware.

For this first trial we engaged with the Thames Valley Police and made a public announcement, without communicating the specific lighting scenarios proposed and their schedule. However, we provided an email address where the residents could give feedback as the weeks progressed. Even though there has been some activity and comments on social media prior to the trial, there were no official complaints or comments received during or post the trial.

Although this trial was very restricted in terms of duration, due to delays accessing the Central Management System (CMS), and the change to the British Summer Time, several

very important observations were made throughout, and major risks were identified, such as:

- a lack of a designated person within the Council to manage and update the status of the street lighting network.
- a lack of in-house expertise to successfully design and implement a borough-wide Adaptive Street Lighting Strategy.
- heavy reliance on Enerveo for running Slough's streetlighting network, without in-house trained staff that can address serious issues in a timely manner.
- a lack of a working contract with both the CMS provider, Enerveo, and the maintenance supplier, Volker.
- serious network infrastructure faults and maintenance issue.

Though some major risks were identified during the initial trial and whilst driving around the borough for the survey sessions, there were some positives coming out as well. We have gained access to the CSM, there are two officers in the Council capable of operating the system, we have a better understanding of our network, and how it should work, we have a perception of what different lighting levels look like in the field, and we gathered basic data that could influence the changes needed to achieve the desired, energy, carbon and cost savings.

During the trial, the overall perceived visibility within the trial zones and throughout the changing lighting regimes was sufficient and in most cases good, and overall more than acceptable to carry out any tasks likely to take place at those times of the day. Whilst driving or on foot, there was no situation where the light was a hindrance and impeded carrying out the simplest of tasks. People's faces, street signs and vehicle registration numbers were visible, and it felt safe to be out and about even after mid-night.

Surveys were carried out to gather illumination level data, on the 23rd February, 1st March, 8th March, and 15th & 16th March 2023, at the various locations within each trial zone.

TRIAL II

The second trial was set to commence on the 15th December 2023 and to be completed until the 31st March 2024. The trial zones were Upton Court, Cippenham Manor, Manor Park & Stoke, Cippenham Village, Colnbrook, A355 Tuns Lane (between M4 j6 and the Copthorne Roundabout), A412 Uxbridge Road (Sainsbury's Roundabout to Borough Boundary).

Before finalising the permanent scheme for an Adaptive Streetlighting Policy, a second trial was carried out in four new residential areas, one already previously used, and two 'A' roads sections. In the second trial we tested out different lighting scenarios in six locations where lighting was gradually reduced throughout the night and throughout the whole trial period, and the seventh location was the same control zone as during the first trial.

Having learned from the errors of the first trial, on this occasion we tested even further not only the perception of the proposed new lighting scenarios, but also the potential savings each could achieve if applied to all the residential areas in Slough. The new sites have been selected based on their location, avoiding any potentially contentious settings including shopping parades, busy highways and junctions, roundabouts and where there is likely to be lots of people congregating at night (busy commercial streets/roads and the town centre), and where there are known crime hotspots, or where TVP advised us otherwise. At the same time, the choice of trial areas was informed by the status and health of the network in those locations, where we knew that the infrastructure was up to the task and was more likely to function as planned.

For this second trial, and in agreement with the Communications Team, it was proposed that residents will not be directly informed about the trial, so that we can fully assess the perceived reactions and avoid any biased responses, as other Councils discovered to be the case during some of their lighting trials. The following lighting profiles were tested.

Scenario	Dusk to 10pm	10pm to midnight	Midnight to Dawn	Duration
4 Residential Stepped Lighting Scenarios & 1 Control				
Lighting profile 1	60%	50%	40%	**5 weeks**
Lighting profile 2	50%	40%	30%	**5 weeks**
Lighting profile 3	40%	30%	20%	**5 weeks**
2 'A' Roads Dusk-to-Dawn Lighting Scenarios				
Lighting profile 1	60%			**5 weeks**
Lighting profile 2	50%			**5 weeks**
Lighting profile 3	40%			**5 weeks**

Having learned from the first trial, this second attempt was far more successful. All the chosen trial zones had most of the lights in working order, the sub-masters were operational, and following three rounds of in person surveys, we could confirm that the scenarios had been implemented as planned.

Before this trial we also engaged with the councillors and members to obtain their support, and to help them visualise our proposed lighting scenarios. Thus, on the 29th November 2023, we carried out a pre-trial demo where we showcased different illumination levels. This was received very well by the Cllrs and they had a chance to ask questions and gain more clarity on how a borough wide adaptive lighting policy might look like, in person.

Appendix 2: Technical Briefing on Streetlighting Trials

Throughout the duration of the trial we had no negative feedback from the TVP and any other stakeholders engaged, and no official complaints were received regarding the new scenarios tested.

TRIAL III

The third and final trial was set to commence on the 20th May 2024 until the 1st September 2024. The trial zones chosen were Haymill, Cippenham Green, Northborough, St. Mary's, Foxborough. In addition to these new zones, all the previous two trial zones were incorporated, in order to achieve the maximum of savings whilst we finalise the permanent scheme for the Adaptive Streetlighting Policy.

Having learned from the errors of the first trial and building on the knowledge gained in the second trial, our aim was to test further not only the perception of the proposed new lighting scenarios, but also the potential savings each could achieve, if applied to all the residential areas in Slough. The new sites have been selected based on their location, avoiding any potentially contentious settings including shopping parades, busy highways and junctions, roundabouts and where there is likely to be lots of people congregating at night (busy commercial streets/roads and the town centre), and where there are known crime hotspots, or where TVP advise us otherwise.

Scenario	Dusk to 10pm	10pm to midnight	Midnight to Dawn	Duration
5 Residential Stepped Lighting Scenarios				
Lighting profile 1	60%	50%	40%	**5 weeks**
Lighting profile 2	50%	40%	30%	**5 weeks**
Lighting profile 3	40%	30%	20%	**5 weeks**

As with the previous trials, the residents were not directly informed about the trial, so that we could fully assess the perceived reactions and avoid any biased responses, as other Councils discovered to be the case during some of their streetlighting trials.

As with the previous two trials, we received no complaints about our lighting profiles, in any of the 16 accumulated trial zones. No other significant issues were identified.

The three trial areas and two 'A' Roads have now all been set to the recommended lighting profile 1 as set out below we are forecasting nearly 80,000 kWh of savings, equivalent to 18 tonnes of CO_2 and a reduction in energy costs of £30k.

Scenario	Residential Areas			'A' Roads
	Dusk to 10pm	10pm to midnight	Midnight to Dawn	Dusk to Dawn
Option 2 - Lighting profile 1	50%	40%	30%	60%