


<p><b>London Borough of Hammersmith &amp; Fulham</b></p> <p><b>CABINET</b></p> <p><b>9 MAY 2016</b></p>	
<p><b>BUSINESS CASE FOR STREET LIGHTING LED LANTERN REPLACEMENT</b></p>	
<p><b>Report of the Cabinet Member for Environment, Transport &amp; Resident Services, Councillor Wesley Harcourt</b></p>	
<p><b>Open Report</b></p>	
<p><b>Classification - For Decision</b>  <b>Key Decision: Yes</b></p>	
<p><b>Wards Affected: All</b></p>	
<p><b>Accountable Director: Mahmood Siddiqi, Director for Transport &amp; Highways</b></p>	
<p><b>Report Author: Ian Hawthorn</b> Head of Highways Maintenance and Projects</p>	<p><b>Contact Details:</b>  Tel: 020 8753 3058  E-mail: <a href="mailto:ian.hawthorn@lbhf.gov.uk">ian.hawthorn@lbhf.gov.uk</a></p>

## 1. EXECUTIVE SUMMARY

- 1.1. This report seeks approval for replacement of existing highway street light lanterns with LED (Light Emitting Diodes) over an 18 month period. This will allow early reductions on future maintenance and column replacement budgets, energy costs and carbon emissions.
- 1.2. Officers have explored alternative funding options however the feedback is that additional use of assets would be required such as Wi-Fi and banner advertising which the Council has already let as a concession to other operators. However officers will continue to seek out opportunities for additional funding throughout the programme as this remains an ever developing industry.
- 1.3. This report also requests approval to manage the 2016/17 planned capital street lighting column replacement programme and to carry out planned and general reactive maintenance work over the same period.
- 1.4. The report also identifies the potential use of CMS (Controlled Management Systems) as new technology that can control lighting levels, measure air quality and collect traffic data. This would be as a second phase implementation package in the main because this is a new

technology untested in the borough and with an estimated additional cost of £2 million. Therefore LED Lighting would be done first to achieve early savings whilst CMS once tested would be deployed bringing potential future savings because the cost of this new technology will decrease with further testing and development.

## **2. RECOMMENDATION**

- 2.1. That approval be given to replace existing 8,343 lanterns with LED technology to achieve early savings in the next three years.
- 2.2. That the expenditure be funded from the Efficiency Projects Reserve.
- 2.3. That a tender for the delivery of a borough LED Lighting Programme be carried out to reduce costs and drive innovation.
- 2.4. To note that the LED lighting programme will be delivered to allow future use of CMS technology. To fully explore the potential benefits and functions the Council will carry out extensive trials of CMS systems to test them in the borough with a view to carrying out implementation as a second phase.

## **3. REASONS FOR DECISION**

- 3.1. Replacing 8,343 lanterns in the borough with LED technology is estimated to cost approximately £3,053,000 (subject to tendered prices) with a payback period of 11.5 years. It is proposed that this be funded from the Efficiency projects Reserve reserves. This investment should produce future additional revenue budget savings of at least £212,000, over and above a £255,000 saving already anticipated in the revenue budget.
- 3.2. If all the proposed lanterns were replaced across the borough this could potentially reduce existing carbon rates by approximately 40%. The overall reduction in revenue costs is estimated to be £468,000. A financial model detailing the anticipated savings is included in Appendix 2.
- 3.3. A number of different LED trials have been undertaken over the last 18 months to gauge performance, aesthetics, light colour, residents perception, using a number of different manufacturers products designed to the current British Standards. In total 217 LED lights from 8 manufacturers have been trialled to date. These findings can be found in Appendix 2.
- 3.4. Decorative lanterns such as those used in Town Centres and heritage lighting would be retrofitted with LED technology to maintain existing aesthetics. The additional cost of this has been included in the financial model.

#### **4. INTRODUCTION AND BACKGROUND**

- 4.1. Current budgets provide £255,000 for planned maintenance of lit assets, £71,800 for general maintenance of signage, £368,000 for capital replacement of old columns, and £524,900 for energy costs at a current rate of 10.6p per kilo Watt hour (kWhr). A total revenue and capital budget of £1.22M.

In addition, the Council has a commitment to reduce carbon (CO<sub>2</sub>) emissions to 40% below 2009 levels by 2016. Lighting improvements up to April 2015 have achieved a 12% reduction. Therefore a minimum further reduction of 28% needs to be achieved to meet the council's target.

- 4.2. The economic analysis is presented in full in Appendix 1.
- 4.3. The council's main opportunity to replace old technology with new is through the capital replacement programme, which allows for approximately 250 column replacements per annum. If this proposal is not accepted it would take over 30 years using existing budget levels to replace all the columns and introduce LED's across the borough.

#### **5. PROPOSAL AND ISSUES**

- 5.1. It is proposed to replace all lanterns on street lights in the borough with LED lanterns over 24 months, with a lead-in of 6 month to prepare tender documents, design specifications and allow for a consultation period prior to starting. The works will be programmed to achieve the savings required by the MTFs and the carbon reduction commitment.
- 5.2. It is proposed to request permission to seek funding to finance the £3.053,000 estimated cost of the works from the Efficiency projects Reserve. External funding has been reviewed and additional companies would expect access to additional funding streams like Wi-Fi and banner advertising, for which concessions have already been let to other operators.
- 5.3. The capital replacement programme will also make use of LED lanterns as part of the programme to start the use of LED lanterns as quickly as possible.

#### **6. OPTIONS AND ANALYSIS OF OPTIONS**

##### ***Options for Achieving Cost Savings and Reducing Carbon Emissions***

- 6.1. The only practical way of achieving the savings at a reasonable pace is to replace the remaining 8,343 of highway street lights in the borough with more energy efficient lanterns, over an 18 month installation period. LED lanterns are proposed for use as they are currently the most energy efficient light source available and therefore provide the largest cost savings and reduction in carbon emissions. The light they provide, whilst

more energy efficient, also provides colour rendering favoured by emergency services and for CCTV enforcement.

- 6.2. Existing lanterns could either be replaced with new LED lanterns, which is the preferred option, or retrofitted with LED technology. Retrofitting is only recommended for existing heritage lanterns in conservation areas and the decorative lanterns in town centre areas, where the intention is to maintain the character of these areas.

### ***Cost of Bulk Replacement of Existing Lanterns with LED Lanterns***

- 6.3. In carrying out our analysis we have used a Street Lighting Toolkit, developed in partnership with the Department of Energy and Climate Change. Appendix 1 indicates the potential savings to budgets with an LED replacement over 1, 1.5, 2, or 3 years. The cost to replace all remaining 8,343 lanterns in the borough with LED lanterns is estimated at a cost approximately £3,053,000, with a payback period of 11.5 years if installed over an 18 month period.
- 6.4. The investment cost of £3,053,000 is based on manufacturers current lantern costs for lanterns. A tendered programme would be used to explore how that figure could be reduced by a competitive process.

### ***Additional Technology Options Identified***

#### ***Controlled Management Systems (CMS) and Motion Sensors***

- 6.5. CMS provides for an exciting opportunity to add a number of benefits to LED lighting. In the market place at the moment companies such as Harvard and Telensa provide facilities such as air quality measurement, pedestrian, cyclist and vehicle counts as well as motion sensors that will control the light levels.
- 6.6. Other Local Authorities Hounslow, Brent, Barnet, Enfield and Transport for London have been implementing a CMS system, unfortunately they have been reported problems one of which is seeing a number of lights on during the day and off during the night, showing this technology is still in its infancy. We are in the process of developing a trial of this technology with equipment provided free by the company at the Talgarth Road Air/Quality scheme. We will be testing light control, pedestrian, cycling and vehicles counts. We will also be in discussion with Westminster and City of London who are also trialling these CMS systems.
- 6.7. CMS systems could potentially provide an additional 20% cuts to energy potentially, by dimming the lights at certain times of the night when vehicle and pedestrian volumes decrease in line with British Standards for lighting. However, the potential additional cost of approximately £2.3M for the borough to implement such a system would result in a repayment rate of more than 20 years.
- 6.8. New developments in CMS have seen potential for greater lighting control, for example Highways England are linking traffic volume sensors with their

CMS system to control the level of light output based on traffic volume. There have been some issues with their accuracy, and because HE roads are predominantly without footways, pedestrian volumes do not need to be considered.

- 6.9. Additional development have seen noise, pollution, act as Wi-Fi units (Or the emerging Li-Fi, visible light Wi-Fi that does not penetrate walls for added security), include gyroscopes to indicate when columns have been hit. However we have had recent negotiation with a company called Silvers Spring Networks who have agreed for us to trial their CMS devices on 10 of our columns on Talgarth Road as part of the Air Quality/SuD's Scheme. Their devices can monitor air quality, motion (To activate either dimming or increase light) and counts various traffic modes including cyclists. Silver Springs Network are also piloting their devices in City of London and Westminster.
- 6.10. The decision to proceed will not prevent the implementation of future CMS and it is expected that cost of this technology will decrease with the new developments with the technology.

### ***Solar Power***

- 6.11. Currently the wattage of even LED lighting is too high to use Solar power adequately. Solar panels would also be of such a size to cause possible complaints from residents over aesthetics, light reflection from the panel surface, and also issues with wind loading.
- 6.12. Currently solar power has only been trialled on an LED sign light where performance has been good, but there have been issues with the battery pack failing that stores the solar energy. There is potential for this to be used in the future, with decreasing LED wattages, and improvements with solar technology.

### ***Energy***

- 6.13. Total expenditure on energy for street lighting in the 2014/15 financial year was around £520,000. This figure includes both metered and unmetered connections, unmetered being the majority of the boroughs street lights operating on a set programme, metered being special lighting with a high output or difficult operation, such as Hammersmith Bridge or subway lights.

### ***Maintenance Savings***

- 6.14. Changing to LED lanterns would reduce spending on routine maintenance, as unlike the lanterns currently used, LED lanterns are sold by manufacturers as not requiring replacement on a routine basis, with a life of up to 20 to 25 years being advised by some manufacturers. As the technology is still relatively new this has not been fully tested yet. However, life expectancy of the light source is expected to be considerably longer than existing lamps. It has been assessed that the savings from not

needing to replace lamps every 4-6 years, as currently undertaken, would be in the order of £12,000 per year.

- 6.15. Savings on reactive maintenance on lanterns as shown on the Financial Model is based on an audit of the last few years of the council's Confirm ordering system, which gave an average of 890 defects per year where a light was reported as not working. The average repair cost is around £30 per defect, totalling £26,700 per year. Other common defects that need to be repaired on existing lanterns that LED lanterns should avoid include lanterns working intermittently and hanging lantern covers, raising that potential saving to £41,000.

### ***Reduction in Capital Works Expenditure***

- 6.16. The capital works budget could be reduced by just under 20% as only the columns would need to be replaced and power transferred, in the future. The LED lanterns would just need to be transferred to the new columns.
- 6.17. The current capital budget as noted in Appendix 1 is £368,000, hence reducing this budget by £70,000 would be possible as part of the bulk LED lantern replacement. This capital expenditure is funded by the annual surplus on the Parking Account. This can be redirected to fund other revenue spend.
- 6.18. This results in total savings of £468,000.

### ***Funding Options***

- 6.19. The cost of replacing 8,343 lanterns with LED lanterns cannot be accommodated within the Street Lighting Department's budgets over a short period. It is recommended that the Council use the efficiency Projects reserve to implement this project, as indicated by finance in section 10 of this report. However below is set out alternative funding options that have been investigated but not found to be satisfactory.
- 6.20. The first would involve borrowing the money for the LED lanterns from a funding company and paying back the loan over a fixed period, using the money saved on energy costs. If this funding option was used the Street Lighting Department's energy budget could not be reduced until after the payback period. The West London Alliance councils have a preferred funding company at present called Salix. Salix currently require repayment of the loan within 5 years, in six monthly instalments, with 0% interest on the loan. However the West London Alliance do not have a framework for us to join and because of the low numbers of lanterns involved in just our borough the savings would not cover the loan within that time period. Most similar funding companies charge interest on the loan, but are more flexible on the repayment term and schedule. Some funding companies also only fund much larger projects of £5 million or more.
- 6.21. A type of Private Finance Initiative funding can be offered by LED manufacturers. This option can be in two variants. A preferred lantern

manufacturer can pay for materials and installation. The Council would make fixed annual payments to them and the supplier would make its profit from energy and maintenance savings and from interest built into the annual charge.. The companies officers spoke to were Orange TEK, CU Phosco and Urbis. They were reluctant to express any interest in LBHF as they regard it as too small for their business model. The 8,400 lanterns in H&F is a small number compared to Lambeth (13,000), Brent (29,000), Barnet (27,000) and Enfield (25,000) . They also indicated that they would need additional funding streams to be incorporated such as Wi-Fi and banners advertising. If the Council were to pay for its own LED lanterns now from its own resources that would not necessarily rule out a PFI style deal in the future, if the Council's smaller stock of streetlights became attractive to the market. In that scenario the Council's lighting infrastructure could be sold to a PFI operator in return for the Council paying an annual charge. The second variation on a PFI deal is that the preferred lantern manufacturer pays for materials and installation, but with no annual payments from the Council. This sort of deal would only be viable if additional features were built in such as the right to operate Wi-Fi or banner advertising from lamp columns. The council currently has existing contracts for both these options with other companies, and cancelling those contracts is not likely to be worthwhile with the Wi-Fi predicted to make some £330,000 per year. Letting the manufacturers have a whole borough dedicated to the use of the boroughs column assets may be a selling point to increase their market visibility, however, as far as officers are aware no manufacturer is yet to take on this type of arrangement for local authority street lighting in the UK, due to the risk and lack of benefits to the manufacturer.

- 6.22. The final option was private funding, such as businesses, wealthy philanthropists, or crowd funding etc., Officers discussed this with other Borough Officers and with people within the industry and could not find where this had been done before. A review of crowdfunding websites such as Kickstarter and Indiegogo suggests that crowdfunding is particularly popular for new products and creative projects being delivered by very small businesses. Investors are typically offered something in exchange for their investment such as the product itself, or for creative projects some degree of involvement or recognition in the credits. It is hard to see the appeal to the public of a large investment in street lighting.
- 6.23. Like all the options above it would require significant work exploring and developing these option with no guarantee for success with the disadvantage of delaying the replacement programme and any savings. The second advantage of the council funding this programme is the potential to offer these lanterns as part of a service package to future contract bidders.

### ***Timeframe***

- 6.24. The report has highlighted two key Council targets; MTFs savings and Carbon Reduction Targets, as a result it is important the existing lanterns are replaced with LED quickly so the forecast savings and carbon

reductions can be realised. To realise the savings in energy and carbon in the quickest way, an 18 month installation programme is proposed.

- 6.25. Using a longer replacement programme than 18 months would allow further advances in LED technology to reduce energy costs and carbon emissions. How far those advances may extend is not known, and the pace of development of LEDs is bound to slow as the technology matures. The CMS technology is likely to have the bigger impact once it is ready to use. Lantern costs would also be likely to reduce over a longer rollout programme as market demand increases. However the advantage of a shorter 18 month programme, as recommended, is that the savings are achieved earlier.

## **7. CONSULTATION**

- 7.1. Officers will work with the Communication team to deliver a notification leaflet for delivery and published on the website explaining the benefits of LED Lighting such as lower energy costs, less light pollution, lower maintenance costs, better lighting (crime prevention) and the work programme.
- 7.2. Ward Councillors, resident and businesses will be informed prior to the replacement works taking place in their area.
- 7.3. There have been meetings with funding and LED Manufacturing companies to assess their requirements for loans and payback details which are incorporated within this report.
- 7.4. Attached in Appendix 6 is the current heritage lighting consultation in conservation areas. And in Appendix 2 is a list of streets where we have already trialled LED Lighting with no adverse feedback.

## **8. EQUALITY IMPLICATIONS**

- 8.1. The proposed works would not cause any notable changes to equality. An EIA Assessment is attached in Appendix 5.
- 8.2. The use of LED lighting will give a sharp cut off of light behind the lantern. This should greatly reduce the amount of obtrusive light into windows, but may also affect visibility to front door key locks. The majority of front yards in Hammersmith and Fulham are very narrow, which should minimise issues seeing door locks, and the council have not heard about any issues from residents regarding this from the LED trails undertaken.

## **9. LEGAL IMPLICATIONS**

- 9.1. The Council is a Highway Authority for the purposes of section 1 (3) of the Highways Act 1980 ("The Act") and is therefore responsible for public highways in the borough. Transport for London are the highway authority for "Red Routes" where the waiting and loading restrictions are red rather than the usual yellow.



- 9.2. Section 97 of the Act provides that a highway authority may provide lighting for any highway or proposed highway. Section 41 of the Act places a duty on the highway authority to maintain highways at public expense. This implies that whilst a highway authority does not have to provide lighting on the highway, where it is not required to maintain it.
- 9.3. Section 17 of the Crime and Disorder Act 1998 places an obligation on the Council to consider crime and disorder in relation to street lighting. This section applies to a local authority and in essence states:
- (1) "Without prejudice to any other obligation imposed on it, it shall be the duty of each authority to which this section applies to exercise its various functions with due regard to the likely effect of the exercise of those function, on and the need to do all that it reasonably can to prevent, crime and disorder in its area".
- 9.4. The above section could be interpreted on the basis that where the provision of street lighting could help to prevent and reduce crime and disorder (in this case the use of better quality lighting by LAD) the Council therefore has a duty to provide and maintain such lighting as well as carry out improvements to street lighting within the borough.
- 9.5. There are a number of Acts of Parliament and Statutory Instruments that apply to the installation and maintenance of street lighting and these are set out below:-
- The Management of Health and Safety at Work Regulations, 1999 and 2006.
  - Electricity at Work Regulations 1989
  - British Standard for the Lighting of Highways
- 9.6. The Council has a duty of care to ensure that highway electrical equipment is maintained in a safe condition, and all its equipment should be maintained to a standard that ensures its, economic, effective and reliable operation. All electrical equipment including that on a public highway must be maintained in accordance with the Electricity at Work Regulations. These regulations require that electrical equipment be regularly tested to ensure its safety and correct operation. In order to minimise the risk to the public of electrical shock from electrical equipment, the Council should undertake regular inspections.
- 9.7. Members will note that an Equality Impact Analysis Toolkit was undertaken and is attached at Appendix 5. The Council in its capacity as highway authority must ensure that the replacement of existing highway lanterns with LED will not adversely affect those who are children, elderly or disabled, including wheelchair users, those that are unable to walk unaided, blind and partially sighted all of whom would find it difficult to get around with less lighting.

9.8. Section 149 of the Equalities Act 2010 provides that the Council must have due regard to when carrying out its statutory function as highway authority so as not to unlawfully discriminate against any person having one of the seven protected characteristics (it is noted that the toolkit identified, Age, Disability and Sex as the primary affected groups). It is therefore considered that any impact on equality issues is low risk (if at all) provided there is compliance with the policy.

9.9. Members are advised that the Human Rights Act 1998 incorporates the European Convention on Human Rights and makes it unlawful for a local authority to act in a way that is incompatible with a Convention Right.

Article 8 of the European Convention should be borne in mind in so far as residents in the borough are entitled to the right to respect for home and private life. In this regard unreasonable light pollution caused by LED lighting could potentially interfere with this right. Likewise Article 1 of the First Protocol states that every person is entitled to peaceful enjoyment of his or her possessions so in the event that residents complained of light pollution in predominately residential areas the Council would have to take a view as to whether it would be reasonable to dim the lighting in those affected areas, having regard to the urban nature of the borough and the paramount requirement to ensure the safety of the road user.

9.10. As mentioned above, the installation of LED lighting should bring long term financial benefits to the Council, which can only be seen as a positive step in ensuring that the replacement programme is delivered within the forecasted budget and by the existing street lighting contractor

9.11. Implications verified/completed by: (Horatio Chance, Solicitor ( & Licensing & Highways) phone 020 8753 1863..

9.12. The proposal to carry out the LED lantern installation work under the current contract with Bouygues E&S Infrastructure Ltd which envisages such upgrade works means that the Council is complying with its obligations under the Procurement laws.

9.13. Implication on Procurement Law verified/completed by: (Babul Mukherjee, Senior Solicitor ( Contracts) 020 7361 3410

## **10. FINANCIAL AND RESOURCES IMPLICATIONS**

10.1. This report recommends the installation of LED lamps for all of the council's street lighting at an upfront cost of £3,053,000.

10.2. It is recommended that this be funded from the Efficiency projects Reserve.. Funding from capital resources was considered but has a revenue consequence. Interest charges arise and the capital investment has to be recharged to revenue over the asset life. Based on an estimated 20 year life, before the lights require replacement, the average annual revenue charge, if capital financing were used (for both interest and loan

repayment) is estimated at £205,000. Using revenue reserves means that these costs do not arise.

10.3. The annual saving in energy is expected to be £357,000 when comparing new expenditure levels with existing spend. This estimate is based on the reduction in energy consumption seen in the LED lighting already installed in the borough. Annual maintenance costs are expected to reduce by £41,000 against budget. There is also a reduction against budget of £70,000 on the column replacement programme, which can be redirected to fund revenue spend. The total annual revenue saving is therefore £467,000 compared with existing spend. In anticipation of this programme proceeding a budget saving of £100,000 has already been included in the 2015/16 budget, with a further £155,000 being included in budgets for 2016/17.

10.4. The net revenue position is summarised below:

Energy Savings	£357,000
Maintenance	£40,000
Column Replacement	£70,000
<b>Expenditure Saving</b>	<b>£467,000</b>
Saving already assumed in budgets	<b>-£255,000</b>
Further Potential MTFS Saving	£212,000

10.5. Using revenue reserves means there would not be a net cost of borrowing and the net revenue saving would be £205,000 larger at £467,000 rather than the £262,000 saving that would occur if capital financing were used.

10.6. Other funding options have been considered but are not recommend. These were:

- **Using s106 funding from planning agreements,** The Council is separately considering how it may use its s106 funding to support its financial position generally, using s106 funding which has purposes that are relatively unconstrained. This means that any s106 funding for LED lighting would have to come from agreements that could not be used for other purposes and are not part of the Council's wider consideration of s106 funding. Only £50,000 has been identified as suitable which would not enable the programme to proceed. Should additional section 106 resources be identified this would reduce the funding required from revenue reserves..
- **Use of PFI or crowd source funding.** It does not appear that such investors would be drawn to invest in LBHF lighting.

10.7. The uncommitted balance of the Efficiency Projects Reserve currently stands at £5.5m. In addition the 2016/17 budget provides for a further £4m contribution to the reserve. The level of reserve will be reviewed as part of the closure of the 2015/16 Accounts.

10.8. Implications verified by: Mark Jones, Director for Finance 020 8753 6700.

## **11. IMPLICATIONS FOR BUSINESS**

11.1 The provision of enhanced lighting from LED's will improve the street environment for business and residents alike. A reduction in maintenance requirements will require less visit on site to columns which will benefit traffic flows and carbon reduction.

11.2 The tender will incorporate the use of local business supplies and services as a factor in deciding the successful contractor.

## **12. RISK MANAGEMENT**

12.1 As Highway Authority, the Council have power under the Highways Act 1980 to provide lighting, while also having a duty of care to prevent danger to road users. Management of our Statutory Duty is noted on the Bi-Borough Enterprise Wide Risk Register as risk number 6, including the subsidiary risks, non-compliance with laws and regulations, and breach of duty of care. Our duty to prevent danger to road users is fulfilled by undertaking an annual replacement and maintenance programme to minimise risks to the Council and road users.

12.2 Details of Hammersmith & Fulham's Street Lighting asset inventory, including asset history, are stored in the Council's database system

12.3 Implications verified/completed by: Dean Wendelborn, Principal Street Lighting Engineer, Tel: 020 8753 1151

## **13. PROCUREMENT IMPLICATIONS**

13.1 The procurement will be undertaken in accordance with the Public Contracts Regulations and the Council's Contracts Standing Orders. As the estimated value of the proposed contract is over £1,000,000 the Business Case setting out the procurement must be approved by the Cabinet Member for Environment, Transport & Resident Services.

13.2 Implications verified/completed by: Alan Parry, Interim Head of Procurement (Job share) 020 8753 2581.

### **LOCAL GOVERNMENT ACT 2000** **LIST OF BACKGROUND PAPERS USED IN PREPARING THIS REPORT**

<b>No.</b>	<b>Description of Background Papers</b>	<b>Name/Ext of holder of file/copy</b>	<b>Department/ Location</b>
1.	None		

## **LIST OF APPENDICES:**

Appendix 1 – LED Lighting Review

Appendix 2 – Financial model

Appendix 3 – Hammersmith & Fulham Lighting Background

Appendix 4 – Capital Street Lighting Replacement Programme road list

Appendix 5 – LBHF Equality Impact Analysis Tool

Appendix 6 – Heritage Lighting Sponsorship in Conservation Areas