

<b>Committees:</b>	<b>Dates:</b>	<b>Item no.</b>
Streets and Walkways Sub-Committee Projects Sub	04/04/2016 13/04/2016	
<b>Subject:</b> Street Lighting Review	<b>Gateway 3/4 Detailed Options Appraisal</b>	<b>Public</b>
<b>Report of:</b> Director of the Built Environment		<b>For Decision</b>

### Summary

#### **Dashboard**

Project Status – Green

Total Estimated Cost – £4m

Total Estimated Saving - £586k pa by 2018/19, £672k pa by 2022/23

Overall project risk – Medium

Total Approved Budget - £100k for initial equipment trial

Spend to Date - £77,826

The majority of the City's street lighting stock is now over 30 years old and is reaching the end of its serviceable life. Maintenance costs are accelerating, energy costs are high and rising, and the Government's carbon tax on energy has further added to the cost of lighting the highway.

A technical equipment evaluation of a Light Emitting Diode (LED) solution for street lighting have been underway for some time to understand the reliability of the equipment and evaluate the potential savings should the City install it. This began in 2011 as a 'spend to save' project, but savings of £275k have since been included in the Service Based Review from 2017/18 on the basis of implementing the project City-wide and moving to a more efficient street lighting operation.

Since the start of this project, the system the City uses to trigger and control its street lighting has also begun to reach the end of its useful life and has become vulnerable to system failure. The supplier of this equipment (Cyclocontrol) is pressing for its urgent replacement at a cost of around £660k, but in addition to this (currently unfunded) cost, there are also significant risks associated with having a major commitment to a small contractor maintaining a bespoke system that's unique to the City, and is reliant on a network of 16 UKPN transformers based around the City.

As a result, parallel trials of a new wireless Central Management System (CMS), embedded in the street lighting unit itself, have been conducted to demonstrate the viability and reliability of such alternative systems. These have proved successful, allowing officers to recommend that this should form part of a fully integrated equipment upgrade.

This report now outlines the cost / benefit of shifting to LED street lighting and, in parallel, the case for a central management system to control that lighting.

Today's cost of operating our street lighting equipment (including both maintenance and energy) is £984k pa, which is expected to rise to over £1.2m pa by 2022/23. A complete shift to LED lighting would lower that to nearer £494k pa by 2018/19, or £550k by 2022/23. In other words, this project would deliver a step change in the cost of

operating the City's street lighting, ensuring that the Service Based Review savings are delivered, payback for the project costs is delivered within an acceptable timeframe, and ongoing costs are contained well within existing revenue budgets in the long term.

In summary, the overall cost of the lighting replacement is now estimated to be £3.6m, with an integrated wireless CMS cost of £470k. With savings estimated to be £586k pa by 2018/19, this would suggest a payback period of around six to seven years.

### **Recommendations**

It is recommended that Members:

- Authorise the progression of the project to Gateway 5, subject to agreement of the funding strategy by Resource Allocation Sub Committee at Gateway 4a.
- Note the requirement to roll forward the existing unspent balance on the project of £22,174 to Gateway 5.

### **Appendices**

<b>Appendix 1</b>	Finance Tables
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### **Contact**

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## Option Appraisal Matrix

	<i>Preferred Approach</i>
<b>1. Brief description</b>	<p><u>Background</u></p> <p>The majority of the City's stock of street lighting equipment is inefficient and beyond its natural life expectancy. Rising maintenance costs are placing increasing pressures on revenue budgets, which cannot afford to fund a bulk equipment upgrade and fail to account for an expected substantial increase in energy costs over the next 10 years.</p> <p>This project was therefore established to evaluate and then provide a system that would facilitate:</p> <ul style="list-style-type: none"> <li>• The capture of savings from using new lighting technology</li> <li>• The consideration of different options for using different lighting levels at different times in different locations.</li> </ul> <p><u>Lighting Technology</u></p> <p>In terms of establishing the savings from new lighting technology, a series of trials have been undertaken to understand the visual impact, reliability, aesthetic appearance and energy usage of different sorts of lighting equipment. This has been instructive, but the rapidly changing technology used for street lighting has meant that the lighting industry is only now settling on a proven, stable and sustainable Light Emitting Diode (LED) solution. As the market settles, the unit cost for this new technology has also started to move downwards, with units becoming more affordable.</p> <p>Overall, the lifespan of this equipment remains in the region of 25+ years, meaning the long-term investment potential remains sound, and the savings to be made through the reduction in energy usage and maintenance costs have been substantiated.</p> <p><u>Lighting Control</u></p> <p>In terms of the options for setting different lighting levels, the main barrier to dynamic lighting is the City's current system for triggering and controlling its street lighting. This bespoke system, called Cyclocontrol, copes with the City's complex lighting network by sending a pulse along the electrical wire from one of 16 UK Power Network substations spread around the City to trigger the street lights on and off.</p> <p>However, that equipment has similarly reached the end of its useful life, with Cyclocontrol pressing for its urgent replacement at a cost of around £660k. Not only has the system become vulnerable to failure, but its capacity to control individual lighting units has proven limited. The City is also vulnerable to the risks of relying on a small contractor maintaining such a key system that is bespoke to the City, and which UKPN have little incentive to support in the long-term.</p> <p>Technology in this field has also developed over recent years, but suppliers of Central Management Systems (CMS) have only recently</p>

proposed alternatives that cope with the City's narrow street pattern and canyon effect. Instead of relying on limited 'line of sight' communications, systems can now work on a mesh basis where units talk to each other by forwarding signals from base stations.

This could facilitate dynamic lighting control in the City, with different lighting levels tailored to meet the needs of different parts of the City at different times, creating a highly efficient network delivering lighting that is truly fit for purpose. It is also expected to deliver highly beneficial real time reporting on both energy useage and faults on the system.

Recent trials have demonstrated that such a solution is now viable and effective in our tight street environment, allowing us to move forward with implementing a central management system in parallel to changing to LED. This control system should ideally be installed within the lighting unit itself, rather than retrofitted, as the warranty of the light unit can be invalidated if this is done after manufacture.

<p><b>2. Scope and exclusions</b></p>	<p><b>Scope</b></p> <ul style="list-style-type: none"> <li>• Replacement of the existing street lighting units in the City with LED lighting. This involves the potential replacement of some 5,600 individual street lighting lanterns and 8,000 'light bulbs'.</li> <li>• Installation of an integrated control management system for that lighting</li> </ul> <p><b>Exclusions</b></p> <ul style="list-style-type: none"> <li>• Street lighting on Transport for London streets</li> </ul>
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**Project Planning**

<p><b>3. Programme and key dates</b></p>	<table border="1"> <thead> <tr> <th data-bbox="557 1232 1067 1296">Task</th> <th data-bbox="1067 1232 1402 1296">Target date</th> </tr> </thead> <tbody> <tr> <td data-bbox="557 1296 1067 1400">Gateway 3/4 (Streets &amp; Walkways, Project Sub Committees)</td> <td data-bbox="1067 1296 1402 1400">April 2016</td> </tr> <tr> <td data-bbox="557 1400 1067 1503">Gateway 4a (Resource Allocation Sub Committee)</td> <td data-bbox="1067 1400 1402 1503">May 2016</td> </tr> <tr> <td data-bbox="557 1503 1067 1606">Scope out different requirements for different light units with JB Riney</td> <td data-bbox="1067 1503 1402 1606">May 2016</td> </tr> <tr> <td data-bbox="557 1606 1067 1671">Tender CMS system</td> <td data-bbox="1067 1606 1402 1671">May / July 2016</td> </tr> <tr> <td data-bbox="557 1671 1067 1774">Finalise prices and confirm lighting recommendations from JB Riney</td> <td data-bbox="1067 1671 1402 1774">July / Aug 2016</td> </tr> <tr> <td data-bbox="557 1774 1067 1839">Gateway 5</td> <td data-bbox="1067 1774 1402 1839">Sept 2016</td> </tr> <tr> <td data-bbox="557 1839 1067 1942">Place orders, award CMS contract and mobilise</td> <td data-bbox="1067 1839 1402 1942">Oct 2016</td> </tr> <tr> <td data-bbox="557 1942 1067 2000">Commence installation</td> <td data-bbox="1067 1942 1402 2000">Jan 2017</td> </tr> </tbody> </table>	Task	Target date	Gateway 3/4 (Streets & Walkways, Project Sub Committees)	April 2016	Gateway 4a (Resource Allocation Sub Committee)	May 2016	Scope out different requirements for different light units with JB Riney	May 2016	Tender CMS system	May / July 2016	Finalise prices and confirm lighting recommendations from JB Riney	July / Aug 2016	Gateway 5	Sept 2016	Place orders, award CMS contract and mobilise	Oct 2016	Commence installation	Jan 2017
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#### 4. Risk implications

##### **Funding not released**

If central funding is not made available:

- upgrade works to LED lighting would only proceed as / when local risk funding becomes available;
- funding of around £660k would still have to be sought to upgrade the Cyclocontrol system;
- the Service Based Review savings would not be delivered, and;
- energy and maintenance costs would exceed available budgets in the medium term.

##### **Cost of works exceed estimates**

Costs have been estimated from officers' knowledge of the market place, but the final cost of the scheme will be refined for Gateway 5 through the procurement approach outlined below.

##### **Savings do not meet current estimates**

The previous equipment trials suggest the current estimates are robust, but further work to refine these estimates will be undertaken for Gateway 5.

##### **The project payback period is deemed excessive**

The estimated cost of the project can now be met much more quickly due to the higher than expected energy and maintenance savings from LED lighting. As a result, a six to seven year payback is estimated for equipment that should last over 20 years, and which should continue to deliver that revenue saving throughout that lifespan.

##### **A control management system is not implemented**

The risk of the current system failing is increasing over time, as is the City's exposure to relying on a small company to operate it. Failure to implement a CMS (replacing Cyclocontrol) would mean that a subsequent system failure would result in:

- Street lights remaining on 24/7; and either,
- The replacement of the exiting Cyclocontrol system at a cost of approx £660k; or,
- An emergency tender followed by the retrofitting of all street lights with a CMS system, potentially invalidating their individual warranties.

##### **Procurement via JB Riney as term contractor**

The procurement approach proposed and agreed with City Procurement is through the City's term contractor, JB Riney. The alternative would be to use an OJEU procurement process that could add six months or more to the programme, delaying the realisation of the project savings and putting the SBR commitment at risk.

##### **Lack of staff resources to progress the project**

The project has now reached the stage at which a dedicated lighting

	<p>engineer is required to finalise the estimated costs and savings, undertake the scoping exercise for procurement and (if approved at Gateway 5) manage the project to completion. This resource cannot be met from the existing lighting team of just three officers, so it is proposed to recruit a dedicated officer on a temporary basis for the project.</p> <p><b>Stakeholder acceptance of lighting changes</b> The intention is to ensure that to begin with, the output of new LED lighting equipment will match the tone, level and colour of the existing lighting as much as possible, so that the impact on stakeholders will be minimised.</p> <p><b>Interface with other Corporate Projects, inc Superfast City Wireless Concession</b> In parallel to this project, there are a number of corporate projects that are likely to be connected to street lighting, including Smart City, the Ring of Steel Upgrade and the Joint Command and Control Room initiative. In particular, the Chamberlain’s Department is well advanced in tendering a 4G Wireless Concession that is likely to require the use of the City’s street lighting units as potential ‘host locations’ for 4G communication small cells, providing powered street furniture to co-host these assets. In addition, the CMS system itself could potentially meet a corporate need to transfer data and information across the City. As a result, these projects are co-ordinating their respective programmes and working closely in partnership to identify common needs, risks and opportunities, thereby ensuring they are effectively aligned.</p>
<p><b>5. Benefits and disbenefits</b></p>	<p><b>Benefits</b></p> <ul style="list-style-type: none"> <li>• A potentially significant reduction in energy, carbon tax and maintenance costs, delivering previously agreed Service Based Review savings as well as keeping projected costs within existing budgets in the long term</li> <li>• More effective and reliable street lighting equipment with significant life spans</li> <li>• Street lighting that can be better controlled, varied and managed, with proactive fault finding and energy reading</li> </ul> <p><b>Disbenefits</b></p> <ul style="list-style-type: none"> <li>• There may be some temporary disruption to localised lighting levels during the rollout. However, the impact on traffic from the work will be minimal.</li> </ul>
<p><b>6. Stakeholders and consultees</b></p>	<p>The Project Board consists of officers from Transportation &amp; Public Realm within the Department of the Built Environment, whilst the Chamberlain’s Department maintains a key role in terms of Finance, City Procurement and IS Division involvement (the latter due to the potential use of street lights as Superfast City Wireless Concession assets).</p>

<b>Resource Implications</b>	
<b>7. Total Estimated cost</b>	<p>The current cost of the LED units themselves is expected to be around £2.6m, with a further £1m required for installation costs, staffing, wiring, fixtures &amp; fittings. The integrated wireless CMS cost is estimated to be around £470k, making a total of £4m.</p> <p>The current estimated cost savings (based on a full rollout of the project by 2018/19), are now calculated to be in the region of £586k by that point, increasing to £672k by 2022/23.</p> <p>In addition, these savings do not account for the likely need to replace the current Cyclocontrol system in the short to medium term. This capital cost is otherwise unfunded, with Cyclocontrol estimating this to be in the region of £660k.</p> <p>Further information of the above can be found in Appendix 1.</p>
<b>8. Funding strategy</b>	<p>Funding is required from City Fund sources. Potential sources are the On-Street Parking Account or City Fund central reserves. The use of the On Street Parking Account would result in a shortfall in the anticipated funds available in the On Street Parking Reserve which are already fully committed to identified schemes. Consequently identified scheme(s) equivalent to the shortfall would need to be deferred. The source of funding will be subject to the agreement of Resource Allocation Sub Committee at Gateway 4a.</p>
<b>9. Ongoing revenue implications</b>	<p>One of the key drivers to the project is the need to address the high and rising energy and maintenance costs of our existing street lighting assets. At completion, the project is expected to deliver significant savings in terms of energy costs and carbon taxes (which at £49k pa currently represent just over 8.5% of the overall energy bill). In addition, there will also be savings in repairs &amp; maintenance, programmed scheduled maintenance and overnight scouting, as the control management system will proactively flag defective street lights.</p> <p>As noted above, based on current costs for these items and the projected savings after completion, the overall savings could be in the region of £586k pa by 2018/19, enabling future costs to be contained well within existing revenue budgets in the long term, and for budgets to be amended accordingly.</p> <p>For a more detailed breakdown of these anticipated savings, see Appendix 1.</p>
<b>10. Affordability</b>	<p>Given the likely costs of the project, this level of potential saving would result in a pay back period (after full project implementation) of around six to seven years, compared to the estimated life of the equipment of over 20 years.</p>
<b>11. Procurement</b>	<p>Different streets in the City require different types of street light, and it has been established over many years that no one single street lighting</p>

<p><b>strategy</b></p>	<p>supplier provides the ‘best’ lighting unit for all of these types across the board. Therefore, instead of a single lighting supplier contract, it is proposed to use the City’s Highways term contractor (JB Riney) to procure and install replacement street lights, allowing there to be some scope to use different suppliers in different locations.</p> <p>For this project, despite the significant increase in the volume of lighting units required, the City Procurement team have confirmed that it can still be procured via the Riney term contract without having to resort to a stand alone EU tender. A scoping exercise would be used whereby the City sets out its requirements, such as lighting output, reliability, design aesthetics and full life costing, and Riney would source and recommend suppliers that best fit those needs.</p> <p>In terms of CMS units, there are three main providers fully engaged in the market, working with lighting manufacturers to deliver integrated lighting units with control units fixed within them.</p> <p>In that context, it is expected that a short tender will be run in conjunction with City Procurement to select a CMS provider to work with the City and Riney deliver the CMS solution with our chosen lighting unit supplier(s).</p>
<p><b>12. Legal implications</b></p>	<p>The City has various statutory responsibilities to maintain a safe highway, some of which are met by establishing and maintaining an appropriate and effective street lighting regime. This project aims to ensure that the City’s statutory duty continues to be met in the long-term.</p>
<p><b>13. Sustainability and energy implications</b></p>	<p>The City Corporation’s Strategic Energy Review identified this project as one that would help meet its objective of reducing the City’s energy use by 40% by 2025.</p> <p>As noted above, at completion this project should contribute significantly towards that target as it is expected to result in savings in energy costs and carbon taxes of over £400k pa by that point.</p>
<p><b>14. Equality Impact Assessment</b></p>	<p>Officers will carry out an Equalities Impact Assessment prior to Gateway 5.</p>
<p><b>15. <u>Recommendation</u></b></p>	<p>Recommended</p>
<p><b>16. Next Gateway</b></p>	<p>Gateway 4a - Inclusion in Capital Programme</p>
<p><b>17. Resource requirements to reach next Gateway</b></p>	<p>In order to reach Gateway 5, work will be required from DBE officers to finalise the equipment trials, scope the City’s technical lighting requirements (with JB Riney) and run a short tender for the central management system. This is expected to cost in the region of £15k in staff time for Transportation &amp; Public Realm.</p> <p>As noted earlier, the project has now reached the stage where a dedicated lighting engineer is required to finalise the estimated costs and savings, undertake these actions and (if approved at Gateway 5)</p>



manage the project to completion. This resource cannot be met from the existing lighting team of just three officers, so it is proposed to recruit a dedicated officer on a temporary basis for the project.

Resources required to reach Gateway 5 can be contained within the existing approved budget subject to the rolling forward of the remaining project budget.

For a more detailed breakdown of the costs so far, as well as the current projected costs and savings of the full project beyond Gateway 5, please see Appendix 1.

## **Appendix 1 – Finance Tables**

Table 1 - Spend to date (Equipment Trial budget)

<b>Description</b>	<b>Approved Budget (£)</b>	<b>Expenditure (£)</b>	<b>Balance (£)</b>	<b>Resources required to Gateway 5 (£)</b>
Equipment (Capital, City Fund)	50k	42,826	7,174	7,174
T&PR Staff costs (Revenue, DBE Local Risk)	50k	35,000	15,000	15,000
<b>TOTAL</b>	<b>100k</b>	<b>77,826</b>	<b>22,174</b>	<b>22,174</b>

Table 2 – Full Project: Current Cost Estimate

<b>Description</b>	<b>Amount (£)</b>
Costs to Gateway 4	78k
Costs to Gateway 5	22k
LED Lighting units	2600k
Central Mgt System*	470k
Wiring, fixtures & fittings	390k
T&PR Staff Costs	100k
JB Riney (Installation)	500k
<b>TOTAL</b>	<b>4,160k</b>

\*If the current cyclocontrol system is replaced like-for-like (instead of introducing a Central Management System), this cost will increase by a further £190k.

Table 3 – Full Project: Current Costs & Projected Increases (Without LED)

Description	2015/16 Cost (£000)	2018/19 Cost (£000)	2022/23 Cost (£000)
Energy	569	639	744
Repairs & maintenance	168	178	193
Cyclical repairs	60	64	69
Scouting	44	47	51
Cleaning	93	99	107
Testing	18	19	21
Painting	5	5	6
Festive	27	29	31
<b>TOTAL NET COST</b>	<b>984</b>	<b>1080</b>	<b>1222</b>

NB. Costs increases are based on inflationary expectations of contract uplifts of 2% pa with our term contractor (JB Riney), and anticipated energy uplifts of 3.9% pa, which is the currently predicted increase in energy cost from the City’s bulk energy purchasing contract (Laser).

Table 4– Full Project: Projected Costs & Projected Increases (With LED)

Description	2015/16 Cost (£000) (Comparison)	2018/19 Cost (£000)	2022/23 Cost (£000)
Energy*	569	191	223
Repairs & maintenance *	168	134	148
Cyclical repairs	60	14	11
Scouting*	44	33	35
Cleaning	93	69	75
Testing	18	19	21
Painting	5	5	6
Festive	27	29	31
<b>TOTAL NET COST</b>	<b>984</b>	<b>494</b>	<b>550</b>

\*If instead of installing a Central Management System, the current cyclocontrol system is replaced like-for-like, these projected costs are likely to increase. Cyclocontrol uses more energy, it has higher on-going maintenance costs, and without the CMS proactive fault finding system, scouting will have to be retained.

Table 5 – Full Project: Projected Savings

Description	2015/16 Cost (£000)	2018/19 Cost (£000)	2022/23 Cost (£000)
Without LED	984	1080	1222
With LED	N/A	494	550
<b>TOTAL NET SAVINGS</b>	<b>N/A</b>	<b>586</b>	<b>672</b>