SURREY COUNTY COUNCIL

CABINET

DATE: **30 OCTOBER 2018**

REPORT OF: **MR COLIN KEMP, CABINET MEMBER FOR HIGHWAYS**

LEAD OFFICER: **JASON RUSSELL, EXECUTIVE DIRECTOR FOR HIGHWAYS, TRANSPORT AND ENVIRONMENT**

SUBJECT: **CONVERSION OF STREET LIGHTS TO LED**

SUMMARY OF ISSUE:

The Council currently spends £3.5 million each year on energy for street lighting. The Council's price for energy on street lighting has risen by 109% over the past 9 years since the PFI contract started – from 7.9p per kilowatt hour to 16.5p per kilowatt hour in 2018/19.

Recent projections indicate energy costs for street lighting will continue to rise by between 5% and 14% per annum over the next 10 years which could mean the annual cost increasing to nearly £13 million in that time and as high as £48 million per year in 20 years if prices rose by 14% each year.

The streetlights are currently dimmed by 25%-50% power from 2200 to 0530 and approximately 45,000 lights in residential areas are switched off between 0100 and 0500 each night. Extending dimming or part night lighting to further reduce costs which have previously been explored are not viable.

By investing approximately £19.9 million over 3 years to convert the council's 89,000 street lights to LED would reduce their consumption by around 60% saving approximately £2 million per year (at today's prices). This project will also save over 6,000 tonnes of CO2 each year – this is the equivalent to the CO2 produced by 2100 return flights from London to Sydney.

In January 2018, Cabinet approved the principle of converting the council's 89,000 street lights to LED to reduce electricity consumption which in turn reduces energy bills and CO2 impact. Cabinet also approved commencing the change process under the street lighting PFI contract to develop a detailed solution.

RECOMMENDATIONS:

It is recommended that Cabinet:

1. approves the conversion of street lights to LED.

2. delegates authority to the Head of Highways and Transport in consultation with the Executive Director of Finance and the Cabinet member for Place to complete the negotiation of the contractual variation and authorise the execution of a Deed of Variation to the Street Lighting PFI contract.

REASON FOR RECOMMENDATIONS:

Energy price inflation is increasing at a significant rate (5%-14% per annum) and to ensure lights are operational when needed, there is little opportunity for the Council to control or reduce its energy costs.

LED technology in street lighting has matured significantly in recent years while the costs have reduced. Many Highway Authorities have either embarked on an LED conversion programme or are in the process of planning to commence one within the next 2-3 years.

Converting to LED will reduce energy consumption by 60% delivering £2 million per year energy savings at today's prices as well as reducing carbon impact by 6200 tonnes

In addition to converting to LED street lighting and upgrading the Central Management System, Officers will be able to explore additional innovations now being used or being developed for use with street lighting such as:

- Providing real-time traffic movement data to help understand and ease congestion
- Adjust lighting levels of traffic routes to suit actual traffic levels which would lead to additional energy savings
- Environmental sensors to detect and monitor air quality

The potential for these innovations may be in direct relation to street lighting (e.g. dimming in response to traffic levels) or in providing a communications network for other areas of the Council (and extending to partners in District and Borough Councils) to connect equipment to improve the services and outcomes they deliver.

Furthermore, these innovations may present grant funding opportunities through central Government departments and the Local Enterprise Partnerships (LEPs) which would reduce the borrowing requirement for the Council.

The PFI contract allows for changes to the specification and service. Following Cabinet approval in January 2018, a Change Notice has been issued under the contract and subject to this approval, officers will finalise the contractual documents and execute a Deed of Variation.

DETAILS:

Progress since January 2018

1. In January 2018, officers presented the 4 options that had been considered:

    a. Option 1 - Do nothing (having issued the PFI Contact Change Notice, the Council would be liable for the reasonable costs incurred by the Service provider to this point in having developed the solution).

    b. Option 2 - Retrofit all existing lanterns with LED gear trays to limit the cost of conversion and minimise equipment waste from entering the recycling system.

    c. Option 3 - Replace all existing lanterns with LED lanterns.

d. Option 4 - A hybrid option of retrofitting 66,000 Libra lanterns in residential areas and on footpaths with LED gear trays and replace the remaining 23,000 Arc lanterns with LED lanterns designed to each road.

2. At the time of Cabinet approval (January 2018), Option 4 was the expected option based on the analysis to that point. However, officers were finalising research into whether all lights could be retrofitted with LED gear trays (Option 2).

3. Under the original PFI investment programme (2010-2015) when lights were replaced on the Council's traffic routes, they were largely designed according to the British Standard for the parameters of each road to ensure a minimum level of light output is achieved across the carriageway and footpath at the same time as achieving as uniform a level as possible between lights.

4. Discussion with a number of lighting professionals including manufacturers has determined that whilst retrofitting LED gear trays on our residential network is highly unlikely to have any detrimental impact on the light outputs and in some cases may see improvements, this will not be the same on traffic routes. The way lanterns such as those on Surrey's traffic routes incorporate many factors to achieve the output of light in each specific design which would be almost impossible to replicate with a retrofitted LED gear tray.

Recommended option:

5. Option 4 ensures the Council can maintain (and possibly slightly improve) the levels of lighting on its roads following a conversion to LED.

6. Skanska Construction UK as the Principal Contractor ran an open tender supported by council officers from both Highways and Procurement. Having completed this process, the Council has been able to determine more accurate costs and a clearer understanding of the savings profile.

7. The table below shows a simple comparison of the difference in street light energy consumption following conversion to LED:

	Annual Consumption (Kilowatt Hours)	**Annual Cost (at today's prices)**
Existing Street Lighting	22.3 million	£3.5 million
Street Lighting Following LED Conversion	8.9 million	£1.5 million
Difference	13.4 million	£2 million

8. In line with the approved recommendation in the January 2018 report, the Council has issued a Change Notice under the PFI Contract.

Overall Street Lighting Savings

9. The current costs for street lighting are £14.85 million per annum. Alongside the energy costs, the Council's PFI contract covers repayments of the original funding to upgrade and replace the street lights from 2010-14 (which are the majority of the costs) and the operation & maintenance of the street lights. These costs (currently £11.35 million per annum) cover:

a. Loan repayments for initial 5 year investment programme

b. 24/7 emergency response for street lighting faults and damage
c. Fault repairs including replacement of lanterns and columns where required
d. Planned maintenance such as safety inspections every 2 years, electrical testing and lamp replacement every 6 years and structural testing every 12 years
e. Management of the Central Management System to identify faults and monitor energy consumption.

10. The table below shows a comparison of the total cost of street lighting between now and when the conversion would be completed.

	PFI Contract Costs	Energy Costs (5% inflation per annum)	Energy Costs (14% inflation per annum
No Change			
2018/19	£11,348,865	£3,500,000	£3,500,000
2023/24	£11,728,038	£4,254,272	£5,911,361
Following conversion to LED			
2018/19	£11,348,865	£3,500,000	£3,500,000
2023/24	£11,728,038	£1,823,259	£2,533,440
Difference	**£0**	**-£2,431,013**	**-£3,377,920**

11. The savings illustrated above are simply the avoided energy costs following conversion to LED but do not include the cost of conversion. The final table below shows estimated net savings over the next 10 years after taking account of the cost of capital (assuming conversion is funded through external borrowing, and 5% energy inflation per year):

Year	Energy Saving	Annual Repayment	Annual Net saving
2019/20	-£351,000	£69,000	**-£282,000**
2020/21	-£1,174,000	£499,000	**-£675,000**
2021/22	-£2,074,000	£997,000	**-£1,077,000**
2022/23	-£2,646,000	£1426,000	**-£1,220,000**
2023/24	-£2,762,000	£1,496,000	**-£1,266,000**
2024/25	-£2,900,000	£1,496,000	**-£1,404,000**
2025/26	-£3,045,000	£1,496,000	**-£1,549,000**
2026/27	-£3,197,000	£1,496,000	**-£1,701,000**
2027/28	-£3,357,000	£1,496,000	**-£1,861,000**
2028/29	-£3,525,000	£1,496,000	**-£2,029,000**

CONSULTATION:

12. Officers prepared a stand outlining the reasons for LED, some of the key "questions and answers" being asked and the benefits including the financial ones of converting street lights to LED. The stand was present along with Highways Officers at each of the 11 District and Borough Joint and Local committees which took place during the early summer months of 2018.

13. In addition, the Council published an online Consultation between 29 June 2018 and 17 August 2018 which was shared with Members and publicised via the Council's social media sites via email to the Highways Customer

Panel (c. 1500 members) and as part of the display at the committees as described in paragraph 12.

14. There were a total of 84 respondents with 49 in favour of the proposals, 20 who stated they were neutral and 15 who indicated they were not in favour of the proposal.

15. Of the 15 that stated an opposition their responses were categorised as follows:

    a. 5 believed it was a waste of money or a weak business case
    b. 9 stated they do not like the light LEDs emit
    c. 1 advised they were aware of publicised health risks which should be fully investigated before proceeding.

16. An overview of progress was presented to the Local and Joint Committee Chairman's meeting in September 2018 and received positive feedback.

RISK MANAGEMENT AND IMPLICATIONS:

17. There is potential for a risk that residents see equipment being upgraded or replaced that has only been installed in the past 4-8 years and question the value of doing so when savings are trying to be made across the Council. Ahead of the work being completed a communications plan will be developed to ensure residents are aware of why the work is being carried out and the savings that will be made as a result alongside clearly stating the impact of not replacing the lights with LED.

18. Replacing 89,000 lights is a significant construction project. There may be localised disruption as lights are changed and this could include lane closures to safely carry out the work. However the work involved does not require any excavation or major road works – in most cases the replacement can be fully carried out in 15-30 minutes to each lantern. As part of its maintenance regime, Skanska already carry out visits of a similar nature to each column at least once every 6 years which would include similar traffic management and impacts where appropriate to ensure the safety of the travelling public and the operatives carrying out the work. Early and ongoing engagement with the Council's Streetworks team will ensure the programme is managed effectively minimising any disruption.

19. Although the energy price projections indicate a rise of between 5% and 14% per annum over the next 10 years, officers have used the lower of these to develop the business case to ensure generated savings will exceed the cost of carrying out the work. Finance Officers have calculated that even if energy prices remained static, the savings generated by converting to LED over their 20 year minimum life would still cover the cost of replacing them. Prices rose by just over 11% in October 17 when prices were last due to be changed.

Financial and Value for Money Implications

Costs and Savings

20. The cost of converting the lights is estimated to be £19.9 million which will be spread across 3 years as the programme of conversions is carried out.

There is a further cost estimated to be £474,000 to deliver the contract change itself (including technical and legal advisors for the Service provider and funders of the original investment capital) which the Council is responsible for. These costs are higher than the estimated values of £18.5 million and £350,000 respectively presented in the January Cabinet report.

21. Whilst still estimates, the updated values are reflective of more developed understanding of the project including a well-developed scope, a more accurate price for the equipment following the tender and detailed pricing around aspects of delivery such as design work and the average number of units that can be converted per day.

22. The change process will see the cost model developed and refined before the Deed of Variation can be executed. Furthermore, there are aspects to work through which officers expect to see reduce the installation costs – for example, Skanska operatives carry out a site visit to each street light at least once every 6 years to clean the lighting equipment, replace the lamp and carry out and certify an electrical test. As these activities will be carried out when converting the lantern to LED (including completing an electrical test), the labour costs associated with this work can be used to offset the cost of converting the lantern reducing the £19.5 million figure.

23. The above costs are therefore the upper threshold used in the business case with officers seeking to reduce those prior to completing the Deed of Variation. The final business case will be reviewed by the Council's Investment Panel prior to proceeding.

24. The savings projected in the January 2018 Cabinet report of 60% energy reduction which is equivalent to approximately £2 million (at today's process) have however been borne out and are in fact expected to be even better. Current estimates suggest savings could be in excess of 65% (generating an additional £180,000 savings per year). The business case has been calculated on the assumption of 60% reduction with any additional savings being used to offset pressures elsewhere in the Council.

Value for Money

25. Under the terms of the PFI contract, the Council cannot conduct a separate tender and so require the existing service provider to develop a solution based on the Council's revised requirements and specification.

26. To ensure the contract and the LED conversion continues to provide the Council with value for money, the service provider has conducted an open book tender with officers from both Highways and Procurement involved in the process. This has allowed officers to scrutinise the product selection as well as prices to achieve that objective.

27. A competitive tender was carried out over the summer with 7 lantern manufacturers and 4 Central Management System (CMS) providers to assess the market and select the best possible solution. Providers were assessed on a number of criteria including overall cost and the ratio of conversion cost to energy saving (for example, a product that cost slightly less overall might deliver 5% less savings scoring less on this aspect than the slightly more expensive product).

28. The evaluation panel comprised officers from both the Highways and Procurement functions alongside operational and procurement colleagues from within Skanska.

Financing

29. The costs of retrofitting and replacing the lanterns and the CMS is currently estimated to be £19.9 million over 3 years from April 2019. The business case has been prepared on the basis of external borrowing (e.g. through the Public Works Loan Board).

30. The January 2018 Cabinet report outlined alternative borrowing and financing sources which included the Green Investment Bank and Salix Energy Efficiency loans alongside working with the Enterprise M3 and Coast to Capital Local Enterprise Partnerships to identify grant funding opportunities. As the final solution and pricing is developed, the Executive Director of Finance will identify the most advantageous financing solution in line with the Council's approved Treasury Management Policy.

Section 151 Officer Commentary

31. The council currently spends £3.5m each year on energy for street lighting, with the potential for prices to continue to increase in future years. Converting street lights to LED would allow the Council to reduce its energy consumption, and therefore cost, while maintaining services to residents. Converting to LED and upgrading the Council's Central Management System is currently estimated to cost £19.9m plus professional fees. This would deliver a reduction in energy consumption, producing an annual net saving of approximately £2m at current prices, after allowing for capital investment costs. The saving would increase if energy costs continued to rise.

32. The costs and savings quoted in this report are estimates. Once the specification and price have been agreed, a final business case (including appropriate price sensitivities) will be considered by the Council's Investment Panel prior to a final decision being made. The current business case assumes that the Council will finance this investment through external borrowing. A number of financing options are being evaluated, and the final solution will be determined by the Executive Director of Finance, in line with the Council's approved Treasury Management Policy.

Legal Implications – Monitoring Officer

33. The Council is the highway authority for its area by virtue of Section 1 of the Highways Act 1980 ("the Act"). The power to provide street lighting is wide and grants discretion to each highway authority to determine the necessary extent or provision of lighting on their highway network. Section 97(1) of the Act states "a highway authority may provide lighting for the purposes of any

highway or proposed highway for which they are or will be the highway authority, and may for that purpose…construct and maintain such lamps, posts and other works as they consider necessary".

34. Under Section 3(1) Local Government Act 1999 the Council is under a general duty of best value to "make arrangements to secure continuous improvement in the way in which its functions are exercised, having regard to a combination of economy, efficiency and effectiveness". In addition to achieving monetary savings, energy efficiency and carbon reduction are an integral part of Government policy and the LED conversion programme will go some way in supporting this.

35. The Council is able to modify existing contracts in certain circumstances set out in Regulation 72 of the Public Contracts Regulations 2015. The modifications proposed in this report fall within these circumstances and as such are permissible without a new procurement procedure.

36. Cabinet will want to satisfy itself that the proposed works and associated costs represent appropriate use of the Council's financial resources and will enable it to achieve its general duty to secure best value in the delivery of its functions.

Equalities and Diversity

37. An Equalities Impact Assessment was carried out prior to the January 2018 Cabinet report and nothing has changed during that time. The section from that report is extracted below:

    a. The outcome of converting street lights to LED will deliver the same levels of lighting as present.

    b. In terms of the work to do this, it will replace the "bulk lamp change" programme which sees all lights visited in a 6 year period to change the lamp (aka bulb) with no excavation and each visit to a column probably lasting around 15-30mins (similar to a fault repair visit). In certain locations lanes may be closed or overnight working scheduled but this is again the same as would be carried out for the bulk lamp change programme.

    c. As a result of the Equality Impact Assessment Screening, it is determined that no protected groups will be impacted either positively or adversely.

Environmental sustainability implications

38. The conversion to LED will have 2 notable environmental impacts:

    a. The conversion to LED will reduce annual electricity consumption from 22.3 million KwH down to 8.9 million KwH. This saving of 13.4 million KwH translates to a saving of around 6,200 tonnes of carbon dioxide each year.

    b. As it has been determined that retro-fitting the 23,000 Arc lanterns is not viable, this will require the lantern to be replaced in full. Inevitably

this will result in a considerable amount of redundant lanterns. As much as possible this will be mitigated in the following ways:

i. In the early phases of LED replacements, old Arc lanterns can be reused to repair damaged or faulty lanterns due for replacement at a later stage. This will reduce the need to produce new lanterns for the short term whilst maintaining uniformity.

ii. Since the PFI contract commenced in 2010, all waste material generated (including throughout the initial replacement programme) has been 100% recycled and this would also be the case for the above replacements.

Public Health implications

39. The January 2018 Cabinet report explored a 2016 report from the American Medical Association (AMA) and a subsequent report by Stockport City Council's Public Health team much of which interpreted the above AMA report.

40. A specific recommendation from the Stockport City Council report was the lower likelihood of any adverse impact by selecting LEDs with lower colour temperatures (3000k or lower) where cost considerations permit. As the colour temperature reduces, the less blue light emitted and the "warmer" the light appears.

41. In the early deployment of LED in street lighting, 5700k colour temperatures were the norm with harsher appearing bluer light being emitted. As recently as 12 months ago many authorities were deploying either only 4000k LEDs or a combination of 4000k and 3000k LEDs.

42. The difference between these LEDs are coats of phosphor being applied to the LED lens (more phosphor to achieve lower colour temperatures). Whilst the differences in manufacturing costs were minimal, the amount of power required to achieve the same level of light output on the ground increased as colour temperature lowered. As a result, installing a lower colour temperature LED increased the power level required to achieve an equivalent replacement product. These increased energy costs when scaled up over the entire asset meant the business case was less attractive.

43. However, the continued developments in the manufacture and use of LED in all applications and in street lighting in particular means the energy required to power LEDs with different colour temperatures has reduced significantly and in most cases is only marginal. As a result Council highways officers have been able to specify a 3000k colour temperature solution across all street lights the Council is responsible for.

WHAT HAPPENS NEXT:

44. Subject to approval by Cabinet:

- Officers will finalise the specification and price to convert the Council's street lights to LED

- The final business case will be reviewed by the Council's Investment Panel, prior to a delegated decision being made.
- Supported by the Council's Legal team, the contract amendments and a Deed of Variation will be drafted, reviewed and agreed by all parties and executed in early 2019.
- A period of mobilisation will take place following the execution of the Deed of Variation likely to be 3-4 months covering:
  - Development and publication of a programme of work showing which areas are planned to be converted and when. This will be supported by information being published via the Council's website and updated on a regular basis as work is completed over the conversion period
  - Allow for the manufacturers to commence production of the new equipment ahead of work starting
  - Commence the design work on traffic routes
- Work will commence in 2019/20 following the mobilisation and is planned to be completed over a 3 year period.

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Annexes:
No Annexes

Sources/background papers:
- Cabinet Paper – January 2018 – Converting Street Lights to LED - https://mycouncil.surreycc.gov.uk/documents/s43052/ITEM%2013%20-%20LED%20Conversion%20-%20Cabinet%20Report%20Final%20PW%20amendments%20170118.pdf