

Wiltshire Council

Environment Select Committee

6 November 2018

Cabinet

11 December 2018

Subject: LED Street Lighting

Cabinet Member: Councillor Bridget Wayman – Highways, Transport and Waste

Key Decision: Yes

Executive Summary

There are almost 45,000 street lights on the Council's highway network. Energy costs have risen sharply in recent years, and they are likely to continue to rise in the longer term. The annual energy costs for street lighting are currently over £1,900,000, and with current budget restrictions these costs are becoming increasingly unaffordable.

Consideration has previously been given to the possibility of introducing Light Emitting Diode (LED) lighting, but the cost of the units and energy costs made this a less attractive option at that time. The Council did implement a scheme to reduce energy consumption by operating the street lighting in the side roads in towns for part of the night only. This scheme was introduced from 2014 in all of the larger towns, and has operated successfully.

Rising energy costs, and the reducing cost of LED lighting, have justified reviewing the case for LED lighting. At present, only 3% of the Council's street lighting is LED lighting, with the majority being the older low pressure sodium (SOX) or high pressure sodium (SON) units. The SOX units are becoming obsolete and going out of production, and are becoming increasingly difficult to obtain.

LED lights use considerably less energy than the older SOX and SON units. A major advantage is that LED lights provide the opportunity to dim the lighting during off-peak periods to further reduce energy consumption. LED lighting dimmed between 8.00pm and 6.00am, with additional dimming after 11.00pm, would typically reduce energy consumption by 69% compared to the current SOX units.

The cost of converting the majority of the Council's street lighting to LED lighting is estimated as being £12,295,000. It is considered that it should be feasible to carry out the installation within two years. Once the installation is complete the scheme is expected to deliver savings of at least £1,312,000 annually at current prices, comprising £250,000 reduction in street lighting maintenance costs and £1,062,000 in reduced energy usage.

A cost benefit analysis has been undertaken. Based on anticipated energy cost increases and borrowing costs, the project would have a positive economic return, and will pay back in 11.88 years.

There are various scheme delivery options, but it is considered that there would be advantages in using the term maintenance contractor to install the equipment so that it can be co-ordinated with existing maintenance work. In order to ensure value for money it is proposed that tenders should be invited for the new LED lighting units.

There is other Council owned lighting in public open space, car parks and housing estates, and consideration could be given to converting this to LED as part of the project, subject to suitability and funding.

Proposals

It is recommended to:

- (i) Agree to proceed with a scheme to replace the Council's older street lighting lanterns with LED units.
- (ii) Acknowledge the economic benefits of the proposed LED lighting project and the environmental benefits it will bring, especially in terms of reduced carbon footprint.
- (iii) Include provision in the Council's capital budget from 2019/20 for the scheme.
- (iv) Approve the proposal to dim the new lighting between 8.00pm and 6.00am, with additional dimming after 11.00pm.
- (v) Give consideration to the options for extending the LED lighting to other suitable Council owned lighting, including in public open space and car parks.
- (vi) Delegate authority to the Cabinet Member, Highways, Transport and Waste and Director, Highways and Transport to invite tenders and award contracts for the supply of LED lighting units in consultation with the Director Finance and Procurement.

Reasons for Proposals

There is a good economic and environmental case for replacing the Council's aging street lighting stock with energy efficient LED lighting, especially in view of the cost and difficulty of maintaining the existing equipment and the rising cost of energy.

Alistair Cunningham
Corporate Director

Wiltshire Council

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Subject: LED Street Lighting

Cabinet Member: Councillor Bridget Wayman – Highways, Transport and Waste

Key Decision: Yes

Purpose of Report

1. To seek approval to proceed with an 'invest to save' project to convert the Council's existing street lighting to more energy efficient LED units, and to approve the procurement of the new lighting units.

Relevance to the Council's Business Plan

2. Wiltshire Council Business Plan 2017 – 2027 sets out the vision to create strong communities, with priorities for growing the economy, strong communities and protecting the vulnerable.
3. The proposal to introduce LED lighting will improve the quality and reliability of the Council's street lighting which will help people get around and access good services (Growing the Economy), reduce anti-social behaviour and improve road safety (Strong Communities).

Background

4. The Council is responsible for the maintenance of the roads in Wiltshire, with the exception of motorways, trunk roads and those in private ownership. There are almost 45,000 street lights on the Council's highway network.
5. Street lighting is a highly technical service, which in Wiltshire is managed by a specialist consultant, Atkins, on behalf of the Council, with a specialist contractor, Ringway Infrastructure Services, carrying out the lighting maintenance. The electricity for the lighting is procured corporately as part of corporate energy purchasing.
6. Energy costs have risen sharply in recent years, and they are likely to continue to rise in the longer term. The annual energy costs for street lighting is currently over £1,900,000, and with current budget restrictions these costs are becoming increasingly unaffordable. The Council has an aspiration to achieve a 50% reduction in carbon by 2020, and street lighting energy provides a significant opportunity to reduce the Council's carbon footprint.

7. At the Council meeting on 28 February 2012 Members asked for a report for Cabinet regarding ways to improve the efficiency of street lighting and reduce energy costs. Subsequently, consideration was given to the possibility of introducing LED lighting, but at that time the cost of the units and energy costs made this a less attractive option.
8. Although the majority of the Council's street lighting is managed by the highways team, there are some that are managed by the Strategic Assets and Facilities Management (SA&FM) team. There are approximately 1,067 lighting columns distributed around the county across 140 sites which include car parks, amenity space and parks and un-adopted roads, with a substantial number of others on housing estate roads.
9. The Council did implement a scheme to reduce energy consumption by operating the highway street lighting in the side roads in towns for part of the night. This scheme was introduced from 2014 in all of the larger towns, and has operated successfully. However, the rising energy costs justify reviewing the situation with regard to LED lighting.

Main Considerations for the Council

Existing Street Lighting

10. The Council's highway lighting stock is generally increasing, especially as new housing estates are adopted and particular lights are repaired or upgraded. These new lights are now usually LED units. However, there are about 45,000 existing street lights of which only 3% are the modern energy efficient LED units.

Lamp Type	Quantity	Percentage
Low Pressure Sodium SOX	20,726	46%
High pressure Sodium SON	20,420	46%
LED	1,493	3%
Other	2,210	5%
Total	44,862	

11. Of particular concern are the SOX units which are now becoming obsolete and going out of production. This is increasing the cost of the few units still available, or requiring the use of more expensive alternatives.
12. It is expected that a similar situation will start to develop with SON units as many users replace these with more energy efficient units. The county's street lighting comprises 92% these older SOX and SON units.
13. The street lighting columns are also an increasing concern as many are reaching the end of their life. This is being managed by a programme of testing of the highest risk columns, and replacement when required.
14. Some street lighting assets, such as illuminated bollards, have already been converted to LED operation. Illuminated signs will need consideration in due course, but these use considerably less energy than the street lighting and are a lower priority for upgrading.

Potential benefits of LED lighting

15. Since the previous consideration of the potential introduction of LED lighting, the costs of LED units have reduced, whilst during the same period the cost of energy for the street lighting has increased substantially.
16. The LED lights use considerably less energy than the older SOX and SON units. A major advantage is that they also provide the opportunity to dim the lighting during off-peak periods to further reduce energy consumption.
17. Lower power LED units can be used to provide similar lighting levels to the older units (see **Appendix 1**). With LED lighting dimming between 8.00pm and 6.00am this would reduce energy consumption by 69% compared to the current SOX units. Further reductions in energy consumption could be obtained by dimming the units more, or by operating the lights for part of the night only as some of the SOX units currently do.
18. Even where part night operation of SOX units is already taking place, a further 45% reduction in energy consumption would be achieved with LED lighting dimmed for part of the night instead.
19. The part night lighting introduced in Wiltshire to date has been on the lower powered units on minor roads. The lighting on main roads has not been changed, and there are considerable energy savings to be made on converting these higher powered units to LED lighting.
20. The current SOX and SON lighting generally requires lanterns to be replaced every three of four years. Already a number of lights have been converted to LED units where carrying out these routine lamp changes is difficult because of restricted access, for example on narrow footpaths, alleyways between buildings and at busy junctions. The LED units are expected to last 25 years which reduces maintenance costs, but they still need regular electrical testing and column inspections.

Potential issues with introducing LED lighting

21. The main disadvantage of the LED units is their higher initial cost. They have reduced in price in recent years, but are still significantly more expensive than the older types of lighting.
22. It is important that the LED units used are specified to ensure that they do have the extended life required, and this would need to be specified as part of the procurement process.
23. The LED lighting units can be heavier than the existing units and can require replacement of the arm or other alterations to the street lighting column, which adds to the cost of conversion.
24. The LED lighting provides a good level of lighting, but it is often different in appearance to the existing lighting. It can be considered by some to appear particularly bright or harsh, especially when the units are newly installed and the

dimming has not started operating. It should be noted that there have been some mixed views about the type of light provided by LED lighting.

25. The existing street lighting has been installed over many decades to different design standards, and in some cases with minimal design. In order to get all of the lighting on the highway network to meet modern standards it would be necessary to redesign it in detail, which would require the positions and spacing of columns to be changed. This would be prohibitively expensive, and it needs to be accepted there will still be some inconsistencies in lighting levels on the network compared to modern standards even with the introduction of more LED lighting.
26. The LED lights are good at directing light to the areas needing to be lit. This is helpful in reducing light pollution and supporting dark skies initiatives. However, the reduced light spill with LED lighting will mean that some residents who have relied on the street lighting to illuminate their garden paths or private properties will have to consider alternative arrangements.

Business Case

27. The cost of converting the street lighting to LED units is estimated to be £12,295,000, which includes costs of £280,000 associated with managing and supervising the installation and implementation of the new units.
28. A cost benefit analysis has been undertaken which is described below. The assessment demonstrated that, with the assumptions made about energy cost increases and borrowing costs, the project has a positive economic return, which will pay back in 11.88 years (see **Appendix 2**).
29. The assessment did not specifically take into account the cost avoidance likely with regard to increasing costs associated with maintaining and replacing the SOX and other older units, and with regard to potential energy increases above the assumed rate of increase. There are likely to be further benefits in cost avoidance as on recent experience energy cost increases may well be greater than 1.5% annually.
30. From the cost benefit analysis it is apparent that there is a good business case for making this investment.

Installation of lighting

31. Should the installation of LED lighting proceed there would be benefits in progressing the scheme in order to complete installation as soon as is possible. This would ensure that the benefits are realised as soon as possible in order to reduce the budget pressures currently being caused by energy costs.
32. The procurement and manufacture time of the units will be a factor in determining the roll out of the new lighting, together with ensuring adequate resources for deployment. In practical terms two years is likely to be the minimum period for installation. A start early in 2019/20 is proposed, subject to procurement and approval of the proposals.

33. It is proposed that the LED lighting should be installed with dimming operating between 8.00pm and 6.00am, with a greater level of dimming after 11.00pm. This regime has been applied at a number of the existing locations in the county without issue.
34. Where existing lighting currently has part night operation it is proposed that rather than switch off the lights completely they will instead be dimmed to a very low level. This still provides large energy savings compared to the existing arrangement, but avoids some of the issues with turning the lights off. Should there be requests to continue the part night operation of specific lights these could be returned to part night operation.
35. The Central Management System (CMS) allows the lighting to be managed remotely. This has enabled lighting to be increased if there are concerns, particularly because of anti-social behaviour. In some cases the CMS has enabled lighting to be turned off after certain hours at the request of the police. The flexibility of the LED lighting and CMS control provides significant benefits to the operation of the street lighting.
36. The installation of the new lighting units is likely to take place based on geographical areas, and will include the introduction of the CMS in many of those areas not currently covered by the system. The CMS enables the remote control of the lighting, which allows dimming to be applied at various levels and the operation to be adjusted to allow for local events or incidents.
37. It is proposed that the installation of LED lighting should start in those areas with the highest number of SOX lamps which were last changed the longest time ago. In the past, a three year cycle has been used to bulk clean and change cycle these lamps and a similar programme will be used to install the LED lighting.
38. Any suitable non-LED lamps installed in the last two years would be taken into storage for potential use in repairs in the short term.
39. The equipment in town centres, decorative lighting and special units in conservation areas will be left to later in the programme as these can use a disproportionate amount of time to arrange and it is important to get as many of the county's lights converted as soon as possible to realise the benefits.
40. Consideration could be given to converting suitable non highway lighting to LED as part of the project, subject to suitability and funding. This could include lighting in public open space, car parks and housing estates. These are managed and maintained via separate legacy contractual arrangements inherited via the district councils prior to creation of Wiltshire Council. Only a small proportion of these lights have been upgraded to LED and many are still older SOX and SON units which are becoming obsolete.
41. Work is underway to identify supply and energy costs of the non-highway lighting, but servicing and maintenance costs are approximately £32,000 annually. A third group of streetlight assets are separately managed as part of the HRA. The Housing team are currently undertaking an asset verification exercise to gain a better understanding of these assets.

42. While separately funded, there may be scope to use the proposed investment in Highways street lighting as a catalyst to regularise and centralise the management of street lighting within the Council to remove duplication. It is not possible to quantify the investment needed to upgrade housing and SA&FM managed streetlights at this stage, though work is underway to establish this.
43. The procurement exercise for the highways lighting could be structured in such a way as to enable the housing and SA&FM streetlights to be upgraded by the same contractor, subject to availability of funding which could be from either a separate capital bid, or from the existing housing maintenance and SA&FM maintenance budgets. Once brought up to the same standard, these streetlights could potentially be managed collectively with the highway lighting.
44. Swindon Borough Council is considering a similar LED project. As the authorities both have the same consultant and contractors the projects are being co-ordinated in order to share knowledge and experience. In view of varying timescales and requirements it is not currently proposed to carry out a joint tender on this occasion.

Overview and Scrutiny Engagement

45. The Environment Select Committee has been invited to comment on this draft report, and the related appendices. The outcome of the Committee's considerations will be reported to the Cabinet meeting.
46. The progress on implementation and operation of the new LED lighting will be monitored and reported to the Environment Select Committee as part of the annual review of the highways service usually made in the autumn.

Safeguarding Implications

47. Does not apply.

Public Health Implications

48. Street lighting has an important role in road safety, and public safety, particularly in town centres and urban areas. It can make an important contribution to reducing the fear of crime and crime prevention in some circumstances.
49. There are some public concerns about the health implications of LED lighting, including potential effects on sleep patterns. There is no definitive guidance to indicate that they are unsafe or more damaging to health in normal circumstances than other lighting sources or natural light. These potential concerns need to be balanced against the clear road and public safety benefits, and environmental benefits of upgrading the street lighting.

Corporate Procurement Implications

50. The current term maintenance contract with Ringway Infrastructure Services includes lighting maintenance, and has rates for the provision of LED lighting. However, these rates were based on the assumption that fairly low numbers of LED units would be required. The scale of the current proposal means that there are likely to be economies of scale in bulk purchasing units which would reduce costs.

51. A stand-alone tender for the supply and installation of the LED lighting would be possible, with a single contractor sourcing and installing the equipment. The contractor would need to obtain the units from the various manufacturers and manage the installation. This would probably provide better value for money than using the rates in the current term contract. However, the work of the contractor would need to be integrated with that of the existing term maintenance contractor who would still be dealing with ongoing routine maintenance and repairs to damaged street lighting and equipment.
52. A series of tenders for the different types of lighting unit required on the network based either on geographical areas or unit types would be feasible. It would, however, be more complex to manage with multiple contractors working on the network at the same time. It would be important to ensure not just the quality of the workmanship and materials, but also the accuracy of recording and updating of the inventory in order to ensure that the reduced energy costs are realised quickly.
53. The lessons learnt from the introduction of the lighting CMS in 2013 indicated that there are advantages in having a single contractor carrying out the installation of new equipment and the routine maintenance of the street lighting. The installation of the LED units is not likely to be straightforward in some cases as column testing or replacement, or arm replacement, may be required before the unit can be fitted. The complexity of the management of this aspect of the work should not be underestimated. It needs to be managed carefully as it could have significant costs which could undermine some of the economic benefits of the scheme.
54. It is proposed that the installation should be managed by the existing term maintenance contractor and co-ordinated with their other work on the network. Most of the existing lighting units have to be changed every three or four years so the contractor is likely to be visiting a third of the units each year anyway. This will enable the amount of advanced design and assessment to be kept to the minimum in order to reduce costs and speed up delivery to realise the project benefits as soon as possible. It will be necessary for the contractor to inspect the column, determine whether column testing or arm replacement is required before installation, and to determine that the correct type of unit is being fitted.
55. The contractor would be responsible for co-ordinating the works, arranging any necessary traffic management, any column replacement, special equipment and wiring required, and updating the inventory. A benefit of offering the installation of the units to the term maintenance contractor would be that it would make up for the significantly reduced reactive and routine maintenance work which will be a consequence of the transfer to LED lighting. It will reduce the risk of any early warning notices or compensation events under the existing contract. The existing term maintenance contractor already has specialist sub-contractors in place to speed up delivery if required.
56. It is proposed that the Council should invite a series of tenders for the supply of the LED lighting units, which represents the majority of the cost involved in the scheme. The installation would be managed by the existing term maintenance contractor and co-ordinated with their other work on the network. The contractor would be responsible for co-ordinating the works and updating the inventory.

57. The specification for the new lighting units would be jointly developed by the consultant and contractor who both have extensive specialist knowledge and experience of this type of work, particularly in connection with Private Finance Initiative (PFI) lighting schemes. As part of the implementation, the contractor would carry out some on site assessments regarding the suitability of the equipment. This would help reduce advance preparation and design costs and provide greater flexibility in delivery.
58. It is considered that the proposed delivery method, with a tender for the supply of the LED units offers the best potential for value for money, and is a practical means of delivering the project with a high certainty of success.

Equalities Impact of the Proposal

59. Having good quality street lighting on the county's roads and footways has benefits for all road users, especially the more vulnerable road users, including pedestrians, cyclists and others.
60. Street lighting has the potential to improve public safety on the streets and in town centres, and the presence of street lighting can be reassuring, especially for the more vulnerable.
61. Fear of crime is a serious consideration, even in a safe county like Wiltshire, and walking along streets with unlit areas may inhibit some members of the community from walking at night or early in the morning, or result in parents refusing to let children walk to school.

Environmental and Climate Change Considerations

62. The introduction of part night street lighting has already reduced the carbon footprint of the Council significantly in recent years, with street lighting energy consumption reducing by 2,830,450KWh since 2013/14.
63. The introduction of LED lighting provides the opportunity to further reduce the energy consumption. The energy consumption for the street lighting units to be converted to LED with this project is expected to reduce from 12,977,500 KWh to 5,262,291 KWh. This equates to a reduction in CO₂ of 1,770 tCO₂ (from 4,950 tCO₂ to 3,180 tCO₂).
64. The proposed conversion of existing lighting units to LED supports the aims of the Council's Energy Change and Opportunity (ECO) strategy.
65. The introduction of new street lighting provides the opportunity to enhance the lighting within the town centres to improve the appearance of key locations. The new lighting would generally have less light spill and should reduce the light pollution of the night sky which occurs with many of the older types of lighting.
66. There are special street lights in conservation and heritage lighting units which would be suitable for conversion. These will require detailed consideration, and will be considered for conversion towards the end of the programme.

67. Street lighting can have an adverse effect on the environment, with potential impacts on wildlife and nature conservation. The current proposal involves the replacement of existing lighting with new lighting in the same locations, and is not expected to change the existing situation significantly in most locations. The CMS will offer the potential to use dimming or different lighting regimes to address any particular issues identified.

Risks that may arise if the proposed decision and related work is not taken

68. The rising cost of energy and the obsolescence of the county's substantial amount of older street lighting will make the provision of street lighting increasingly unaffordable. This would inevitably result in a reduction in the number of operating street lights and reduced hours of operation.
69. The hours of operation of some of the Council's street lighting has already been reduced through the part night scheme. That scheme only affected some of the minor roads in towns, and was achieved by careful design to avoid large dark areas and to ensure that key routes and town centres remain well lit. Further reductions in lighting are likely to be significantly less popular and could lead to concerns about safety and crime.
70. The removal of street lighting would address the rising cost of energy, but there are substantial costs in decommissioning the existing lighting, disconnecting it and making it safe, as well the adverse publicity aspects.

Risks that may arise if the proposed decision is taken and actions that will be taken to manage these risks

71. There is a risk that the tendered prices may be above those anticipated. The scope of the scheme is flexible enough to accommodate changes in prices, provided the overall budget is not exceeded, and the business case is not adversely affected. The scheme will be reviewed at the various stages of its implementation to ensure its continuing viability.
72. A tried and tested contract management process is already in place in the highways service which is currently successfully delivering a wide range of services each year with a value of several million pounds.
73. These risk management processes and contract procedures would be used to manage the project, and the delivery of the new lighting units and manufacturers will be integrated in these processes.
74. There is a risk that adequate resources to install the equipment may be difficult to obtain, with the current high work levels across the industry. The timescale for manufacture may be a problem, but early indications are that there should be capacity. It will be necessary to monitor these potential issues as part of the management process.

Financial Implications

75. Some authorities have been successful in obtaining PFI or Capital Challenge funding for improvements to their street lighting. This Council was unsuccessful in its last bid for such funding, and it seems that these opportunities are reducing.
76. The most appropriate source of funding for lighting improvements in the current circumstances would be an 'invest to save' scheme, with the borrowing being paid back from the energy and maintenance savings. The Treasury team will look to finance the programme by the best available option which may include part funding by an interest free Salix loan; however, for the purpose of assessment it has been modelled on annuity borrowing.
77. The LED lighting proposals have been assessed with a 25 year business case model using a standard Net Present Value (NPV) appraisal method. Energy cost increases have been modelled to allow for uncertainties about future energy costs.
78. The cost benefit assessment has been carried out using the assumption that energy costs will increase by 1.5% annually, which is considerably less than recent increases. It has been assumed that maintenance costs of existing lighting will increase by 2% annually. The cost of borrowing is 2.78% and a discount rate of 3.5% has been used.
79. The cost of converting the street lighting to LED units (45,000 units in total) is estimated to be £12,295,000, which includes £280,000 costs associated with managing and supervising the installation and implementation. Any column replacement will be funded through the structural maintenance capital programme and has not been included in this assessment. Columns will only be replaced where necessary for safety reasons. The majority of the expenditure would be incurred in the first two years of implementation.
80. Once the installation is complete the scheme is expected to deliver savings of at least £1,312,000 annually at current prices, comprising £250,000 reduction in street lighting maintenance costs and £1,062,000 on reduced energy usage. The LEDs are forecast to reduce the Highways network energy consumption by 57.4% overall.
81. The benefits of the reduction in energy costs would start within a month of the start of installation as the inventory is updated. It is anticipated that there would be a continuous increase in savings as installation progresses until the full benefits are realised after two years.
82. The assessment indicated that, with the assumptions made about energy cost increases and annuity borrowing costs, the project has a positive economic return, which will pay back in 11.88 years.
83. The capital financing cost (Minimum Revenue Provision and interest) on this programme would be £785,000 per year based on an interest rate of 2.28% and 25 year asset life.

84. A savings target of £400,000 was included in the Highways Street Lighting Energy budget in 2018/2019 for Street Lighting LED programme. This programme can deliver these saving and cover the capital financing costs of £785,000 once the installation is complete. This pressure is being managed in 2018/2019 by one off savings and will need to be managed in 2019/2020 until the programme completes in 2020/2021 and delivers the full savings.
85. As well as the calculated economic and environmental benefit there are also considerable cost avoidance benefits with the scheme. The increasing cost of SOX and SON units in the future is a serious concern.
86. Overall, the schemes would have economic benefits for the Council.

Legal Implications

87. The Council has a duty under the Highways Act 1980 to maintain the county's roads. The highway inspection procedures, policies and improvement plans ensure that this duty is fulfilled.
88. There is no legal requirement for the Council to provide street lighting, but where lighting is provided there is a responsibility to keep it in safe condition.
89. Procurement of the new lighting units would have to be in accordance with current legislation and the Council's approved procurement procedures.

Options Considered

90. Not addressing the issue of rising energy costs was not considered to be a viable option in view of current budget limitations. A saving of £400,000 has already applied to the Highways Street Lighting budget in relation to this programme.
91. The option of extending the existing part night light scheme is no longer considered a viable long-term option because of the increasing cost and difficulty of obtaining the SOX and SON units currently in use.
92. The turning off and decommissioning of existing street lighting is undertaken in the small number of cases where lighting is no longer required, but doing this on a larger scale would have an impact on the public with concerns about road and public safety. There are also considerable costs involved in decommissioning and removing street lighting.
93. The project could be extended to include the replacement of the lighting columns as well as the lanterns. This would have benefits but would significantly increase costs and undermine the economic case for the project based on the NPV assessment. The testing and replacement of the street lighting columns will have to continue as part of the ongoing programme of lighting maintenance.

Conclusions

94. The Council has considered options for reducing street lighting energy costs in view of rising energy costs and has concluded that a scheme to replace older lighting units with LED units would be beneficial.

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The following unpublished documents have been relied on in the preparation of this Report:

None

Appendices

Appendix 1 – Energy Consumption of Lighting Units
Appendix 2 – Cost Benefit Assessment Summary